GB

Forced draught gas burners

Progressive two-stage or modulating operation

CE

CODE - CÓDIGO	MODEL - MODELO	TYPE - TIPO
3910510	RS 25/M BLU	876 T
3910511	RS 25/M BLU	876 T
3910610	RS 35/M BLU	877 T
3910611	RS 35/M BLU	877 T
3910640	RS 35/M BLU	877 T
3910641	RS 35/M BLU	877 T

GB **CONTENTS**

N.B.
Figures mentioned in the text are identified as follows:
1)(A) = part 1 of figure A, same page as text;
1)(A)p.3 = part 1 of figure A, shown on page 3.

INFORMATION ABOUT THE INSTRUCTION MANUAL

INTRODUCTION

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

DELIVERY OF THE SYSTEM AND THE INSTRUCTION MANUAL

When the system is delivered, it is important that:
- The instruction manual is supplied 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 carefully informs the user about:
  - the use of the system,
  - any further tests that may be necessary before the system is started up,
  - maintenance and the need to have the system checked at least once a year by the manufacturer or another specialised technician. To ensure a periodic check, the manufacturer recommends the drawing up of a Maintenance Contract.

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

Manufacturer:	RIELLO S.p.A.
Address:	Via Pilade Riello, 7 37045 Legnago (VR)
Product:	Forced draught gas burners
Model:	RS 25-35/M BLU

These products are in compliance with the following Technical Standards:

EN 676

EN 12100

and according to the European Directives:

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

Such products are marked as follows:

CE CE-0085BR0379

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

Manufacturer's Declaration

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

Product	Type	Model	Power
Forced draught gas burners	876 T	RS 25/M BLU	45 - 370 kW
	877 T	RS 35/M BLU	70 - 480 kW

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.riellobburners.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

It is hereby certified that the apparatuses specified below conform with the model of the type described n the CE conformity declaration and they are produced and placed in circulation in conformity with the provisions defined in L.D. dated January 8, 2004 and July 17, 2009.

Type of product:	Forced draught gas burners			
Model:	RS 25-35/M BLU			
Regulation applied:	EN 676 and A.R. dated January 8, 2004 - July 17, 2009			
Control body:	TÜV Industrie Service GmbH TÜV SÜD Gruppe Ridlerstrase, 65 80339 München DEUTSCHLAND			
Measured value:	RS 25/M BLU		RS 35/M BLU	
	CO max:	14 mg/kWh	CO max:	1 mg/kWh
	NOx max:	72 mg/kWh	NOx max:	56 mg/kWh

SVGW Declaration

RIELLO S.p.A. declares that the **RS 25-35/M BLU** forced draught gas burners comply with the following Directives and technical regulations:

SSIGA	Gas Appliance Directive G1
AICAA	Fire prevention regulations
	Several cantonal and municipal regulations on air quality and energy conservation.

Legnago, 21.04.2018

Executive General Manager
RIELLO S.p.A. - Burner Department
Mr. U. Ferretti

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

TECHNICAL DATA

MODEL			RS 25/M BLU		RS 35/M BLU		RS 35/M BLU	
TYPE			876 T		877 T		877 T	
OUTPUT (1)	MAX.	kW Mcal/h	125 - 370 108 - 320		202 - 480 174 - 413		202 - 480 174 - 413	
	MIN.	kW Mcal/h	45 39		70 62		70 62	
FUEL			NATURAL GAS: G20 - G21 - G22 - G23 - G25					
			G20	G25	G20	G25	G20	G25
- net calorific value		kWh/Sm^3 Mcal/Sm^3	9.45 8.2	8.13 7.0	9.45 8.2	8.13 7.0	9.45 8.2	8.13 7.0
- absolute density		kg/Sm^3	0.71	0.78	0.71	0.78	0.71	0.78
- max. delivery		Sm^3/h	39	45	51	59	51	59
- pressure at max. delivery (2)		mbar	15.6	21.8	14.1	24.7	14.1	24.7
OPERATION			• On-Off (1 stop min each 24 hours). • Progressive two-stage or modulating by kit (see ACCESSOIRES).					
STANDARD APPLICATIONS			Boilers: water, steam, diathermic oil					
AMBIENT TEMPERATURE		°C	0 - 40					
COMBUSTION AIR TEMPERATURE		°C max	60					
ELECTRICAL SUPPLY		V Hz	230 ~ +/-10% 50/60 - single-phase				230 - 400 with neutral ~ +/-10% 50/60 - three-phase	
ELECTRIC MOTOR		rpm W V	2800 300 220 - 240		2800 420 220 - 240		2780 450 220/240-380/415	
ACCELERATION CURRENT		A	15		17		14 - 10	
WORKING CURRENT		A	3.2		3.5		2 - 1.4	
MOTOR CAPACITOR		µF/V	12.5/260		12.5/420		-	
IGNITION TRANSFORMER		V1 - V2 I1 - I2	230 V - 1 x 15kV 1 A - 25mA					
ELECTRICAL POWER CONSUMPTION		W max	600		700		750	
PROTECTION LEVEL			IP40					
NOISE LEVELS (3)	SOUND PRESSURE SOUND POWER	dBA	68 79		70 81		70 81	

(1) Reference conditions: Room temperature 20°C - Gas temperature 15°C - Barometric pressure 1013 mbar - Altitude 0m above sea level.
(2) Socket pressure 7)(A)p.4 with zero pressure in the combustion chamber.
(3) Sound pressure measured in manufacturer's combustion laboratory, with burner operating on test boiler and at maximum rated output. The sound power is measured with the “Free Field” method, as per EN 15036, and according to an “Accuracy: Category 3” measuring accuracy, as set out in EN ISO 3746.

STRUCTURAL VERSIONS

MODEL	POWER SUPPLY	BLAST TUBE LENGTH mm
RS 25/M BLU	Single-phase Single-phase	230 365
RS 35/M BLU	Single-phase Single-phase Three-phase Three-phase	230 365 230 365

GAS CATEGORIES

DESTINATION COUNTRY	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)) - 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}

ACCESSORIES (optional):

• RADIO DISTURBANCEPROTECTION KIT

If the burner is installed in places particularly subject to radio disturbance (emission of signals exceeding 10 V/m) owing to the presence of an INVERTER, or in applications where the length of the thermostat connections exceeds 20 metres, a protection kit is available as an interface between the control box and the burner.

BURNER	**RS 25/M BLU - RS 35/M BLU**
Code	3010386

• LONG HEAD KIT

BURNER	**RS 25/M BLU**	**RS 35/M BLU**
Code	3010430	3010431

• KIT FOR LPG OPERATION: the kit allows the RS 25-35/M BLU burners to burn LPG.

BURNER	**RS 25/M BLU**	**RS 35/M BLU**
Output kW	80/125 - 370 kW	120/200 - 470 kW
Blast tube length mm	230 - 365	230 - 365
Code	3010423	3010424

• KIT FOR MODULATING OPERATION

OUTPUT POWER REGULATOR KIT RWF50

Two components should be ordered:
• the Output power regulator to install on the burner;
• the Probe to install on the heat generator

Parameter to control		**Probe**		**Output power regulator**	
	Adjustment field	Type	Code	Type	Code
Temperature	- 100...+500°C	PT 100	3010110	RWF50.2 RWF55.5	20083339 20098541
Pressure	0...2.5 bar 0...16 bar	Output probe 4...20 mA	3010213 3010214		

SIGNAL CONVERTER KIT 4-20 mA, 0-10V

Two components should be ordered:
• the Analogical signal converter;
• the Potentiometer

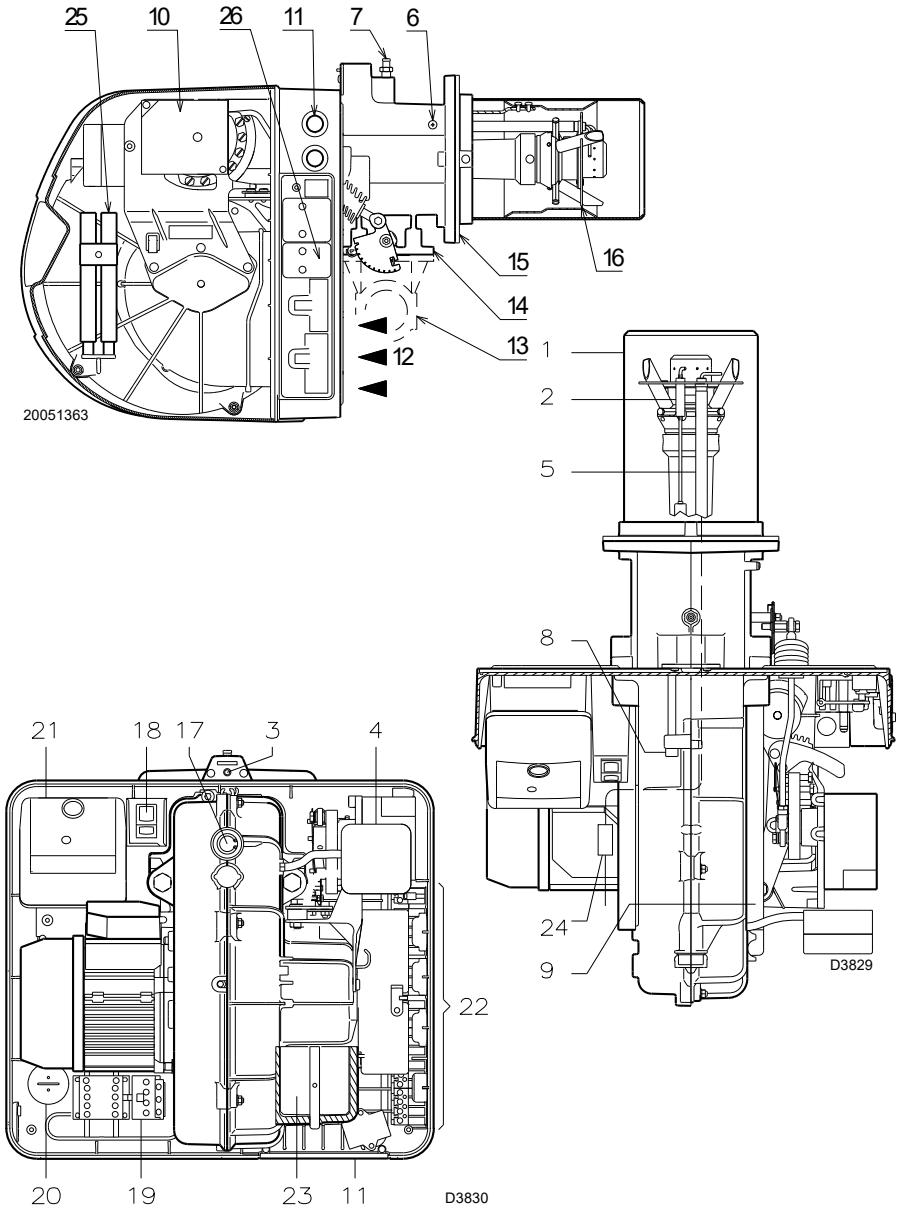
Potentiometer		**Analogical Signal Converter**	
Type	Code	Type	Code
ASZ...	3010420	E5202	3010410

• POTENTIOMETER KIT FOR THE INDICATION OF LOAD POSITION	Code 3010420
• MAXIMUM GAS PRESSURE SWITCH	Code 3010418
• KIT CLEAN CONTACTS	Code 3010419
• KIT POST-PURGING	Code 3010451

• KIT GROUND FAULT INTERRUPTER	Code 3010448
• KIT CONTINUOUS PURGING	Code 3010449
• KIT HOURCOUNTER	Code 3010450
• KIT INTERFACE ADAPTER RMG TO PC	Code 3002719

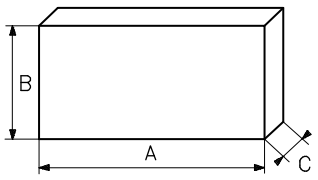
• GAS TRAINS TO COUPLE WITH THE BURNER, ACCORDING TO REGULATION EN 676 (complete with valves, pressure adjuster and filter): see page 9.

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



(A)

mm	A	B	C	kg
RS 25/M BLU	1000	500	485	32
RS 35/M BLU	1000	500	485	33



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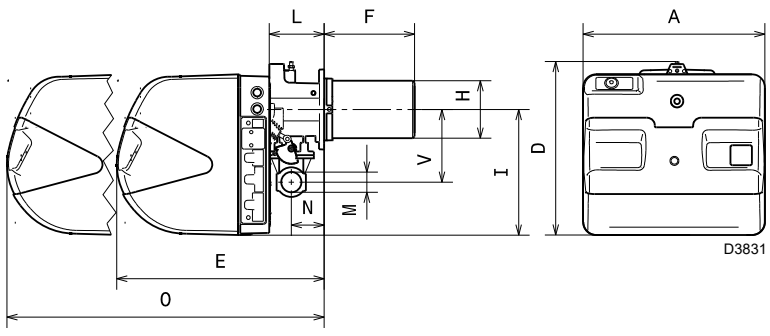


(C)

mm	A	D	E	F (1)	H	I	L	O	N	V	M
RS 25/M BLU	442	422	508	230-365	140	305	138	780	84	177	1”1/2
RS 35/M BLU	442	422	508	230-365	152	305	138	780	84	177	1”1/2

(1) Blast tube: short-long

BURNER DESCRIPTION (A)

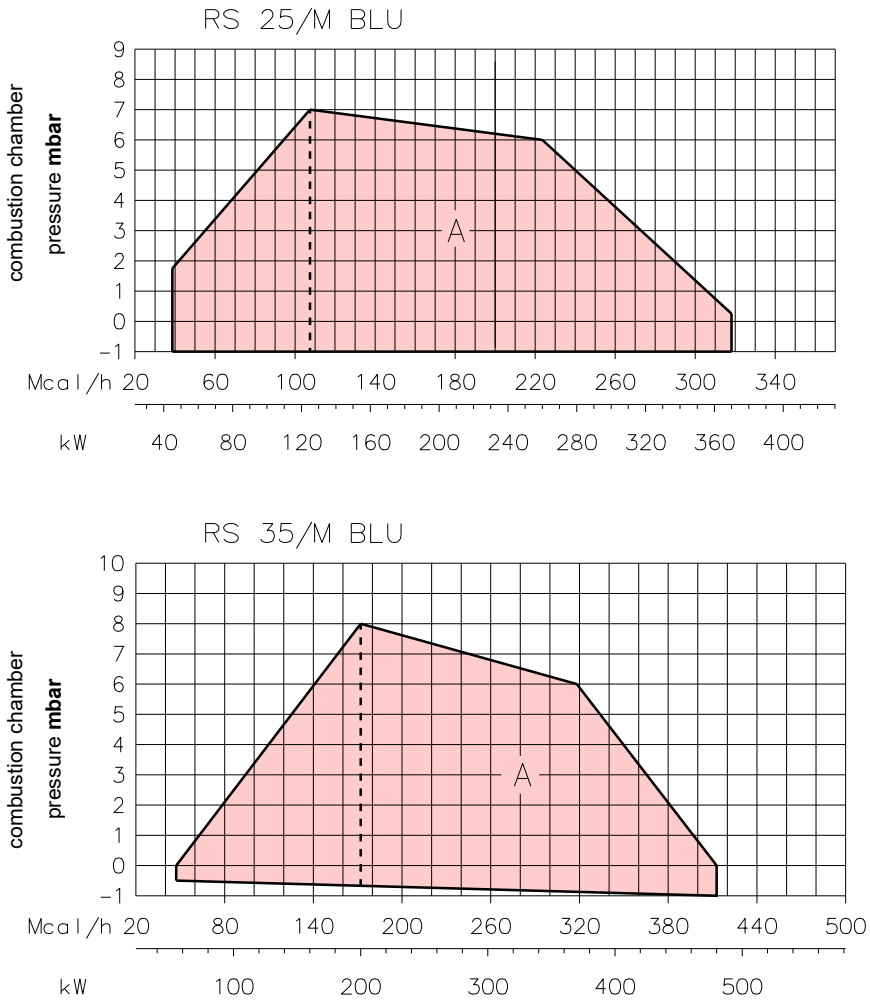
1 Combustion head
2 Ignition electrode
3 Screw for combustion head adjustment
4 Minimum air pressure switch (differential operating type)
5 Flame sensor probe
6 Air pressure socket
7 Gas pressure test point and head fixing screw
8 Screws securing fan to sleeve
9 Slide bars for opening the burner and inspecting the combustion head
10 Servomotor controlling the gas butterfly valve and the air damper (by means of a variable profile cam mechanism).
When the burner is stopped, the air damper will be completely closed to reduce heat loss due to the flue draught, which tends to draw air from the fan air inlet.
11 Areas for passage of electric cables
12 Air inlet to fan
13 Gas input pipework
14 Gas butterfly valve
15 Boiler mounting flange
16 Flame stability disc
17 Flame inspection window
18 Power switch for different operations:
automatic - manual - off
Button for:
power increase - power reduction
19 Motor contact maker and thermal cut-out with reset button (RS 35/M BLU three-phase)
20 Motor capacitor (RS 25/M BLU single-phase)
21 Control box with lockout pilot light and lockout reset button
22 Sockets for electrical connection
23 Air damper
24 Plug-socket on ionisation probe cable
25 Guide extensions (long head version)
26 4-pole socket cover (see electrical panel appendix)

Two types of burner failure may occur:
- **CONTROL BOX LOCKOUT:**
if the control box 21)(A) pushbutton lights up, it indicates that the burner is in lockout.
To reset, press the push button.
- **MOTOR LOCKOUT** (RS 35/M BLU three-phase):
three-phase electrical supply; to unblock, press the thermal relay switch 19)(A).

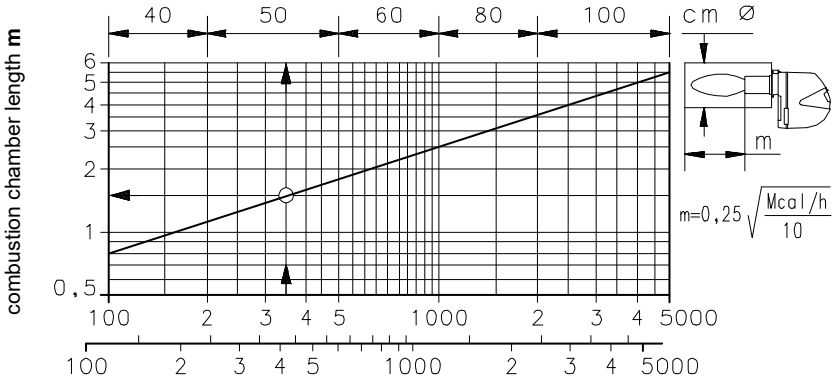
PACKAGING - WEIGHT (B) - approximate measurements
- The burners are shipped in cardboard boxes with the maximum dimensions shown in tab. (B).
- The weight of the burner complete with packaging is indicated in tab. (B).

MAX. DIMENSIONS (C) - approximate measurements
The maximum dimensions of the burner are given in (C).
Bear in mind that, in order to inspect the combustion head, the burner must be pulled back.

STANDARD EQUIPMENT
1 - Gas train flange
1 - Flange gasket
4 - Flange fixing screws M 8 x 25
1 - Thermal insulation screen
4 - Screws to secure the burner flange to the boiler: M 8 x 25
3 - Plugs for electrical wiring (RS 25-35/M BLU single-phase)
4 - Plugs for electrical wiring (RS 35/M BLU three-phase)
1 - Instruction booklet
1 - Spare parts list



(A) D9305



(B) D497

FIRING RATES (A)

During operation, burner output varies between:

- a **MAXIMUM OUTPUT**, selected within area A,
- and a **MINIMUM OUTPUT**, which must not be lower than the minimum limit in the diagram.

RS 25/M BLU = 45 kW
RS 35/M BLU = 72 kW

Important

The FIRING RATE values have been obtained considering an ambient temperature of 20°C, an atmospheric pressure of 1013 mbar (approx.0m above sea level), and with the combustion head adjusted as shown on page 8.

TEST BOILER (B)

The firing rates were set in relation to special test boilers, according to EN 676 regulations.
Figure (B) indicates the diameter and length of the test combustion chamber.

Example

Output 350 Mcal/h:
diameter = 50 cm - length = 1.5 m.

COMMERCIAL BOILERS

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 diagram (B).
If the burner must be combined with a commercial boiler that has not been CE approved and/or its combustion chamber dimensions are clearly smaller than those indicated in diagram (B), consult the manufacturer.
In addition, for inversion boilers you are advised to check the length of the combustion head, as indicated by the boiler manufacturer.

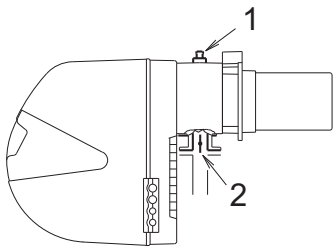
RS 25/M BLU

kW	1 Δp (mbar)	2 Δp (mbar)
	G20	G20
125	1.8	0.1
140	2.6	0.1
160	3.8	0.1
180	4.9	0.2
200	6.0	0.2
220	7.2	0.2
240	8.3	0.3
260	9.4	0.3
280	10.5	0.4
300	11.7	0.5
320	12.8	0.5
340	13.9	0.6
360	15.0	0.7
370	15.6	0.7

RS 35/M BLU

kW	1 Δp (mbar)	2 Δp (mbar)
	G20	G20
200	2.8	0.2
220	3.6	0.2
240	4.4	0.3
260	5.2	0.3
280	6.0	0.4
300	6.8	0.4
320	7.6	0.5
340	8.5	0.6
360	9.3	0.6
380	10.1	0.7
400	10.9	0.8
420	11.7	0.8
440	12.5	0.9
460	13.3	1.0
480	14.1	1.1

(A)



(B)

S8738

GAS PRESSURE

The adjacent tables show minimum pressure losses along the gas supply line depending on the maximum burner output operation.

Column 1
Pressure loss at combustion head.
Pressure of the gas at the socket 1)(B), with combustion chamber at 0 mbar.

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

The values shown in the various tables refer to:
natural gas G 20 PCI 9.45 kWh/Sm^3
(8.2 Mcal/Sm^3)

Calculate the approximate maximum output of the burner in this way:
- subtract the combustion chamber pressure from the gas pressure measured at test point 1)(B).
- find, in the table relating to the burner concerned, the pressure value closest to the result of the subtraction.
- read the corresponding output on the left.

Example - RS 35/M BLU:
- Maximum output operation
- Natural gas G 20 PCI 9.45 kWh/Sm^3
- Gas pressure at test point 1)(B) = 11.3 mbar
- Pressure in combustion chamber = 2 mbar
  11.3 - 2 = 9.3 mbar

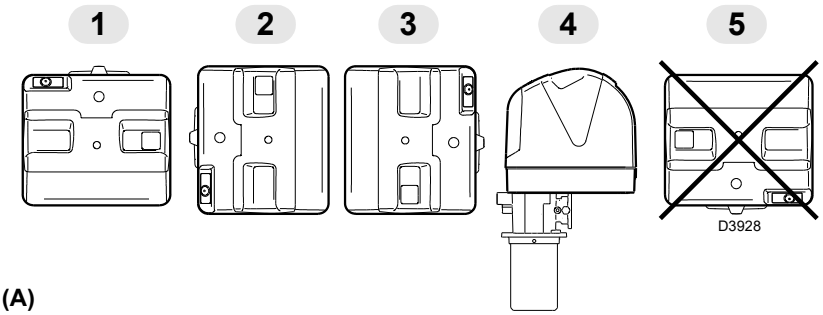
A maximum output of 360 kW shown in Table RS 35/M corresponds to 9.3 mbar pressure, column 1.
This value serves as a rough guide; the effective output must be measured at the gas meter.

To calculate the required gas pressure at test point 1)(B), set the maximum output required from the burner operation:
- find the nearest output value in the table for the burner in question.
- read, on the right (column 1) the socket pressure 1)(B).
- add this value to the estimated pressure in the combustion chamber.

Example - RS 35/M BLU:
- Required burner maximum output operation: 360 kW
- Natural gas G 20 PCI 9.45 kWh/Sm^3
- Gas pressure at burner output of 360 kW, taken from table RS 35/M BLU, column 1 = 9.3 mbar
- Pressure in combustion chamber = 2 mbar
  9.3 + 2 = 11.3 mbar
  pressure required at test point 1)(B).

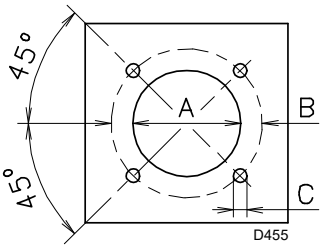
WARNING

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



(A)

mm	A	B	C
RS 25/M BLU	160	224	M8
RS 35/M BLU	160	224	M8



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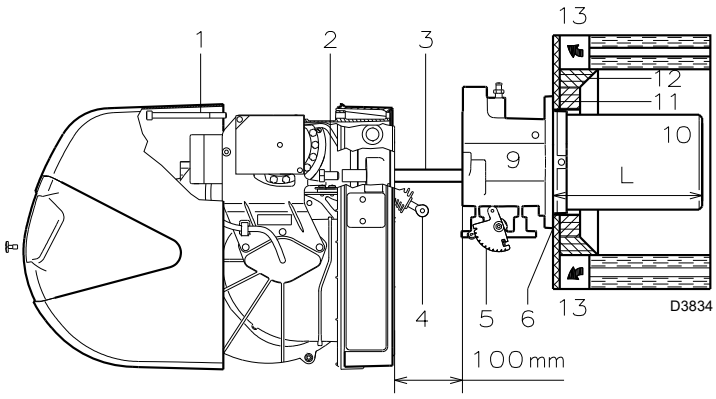

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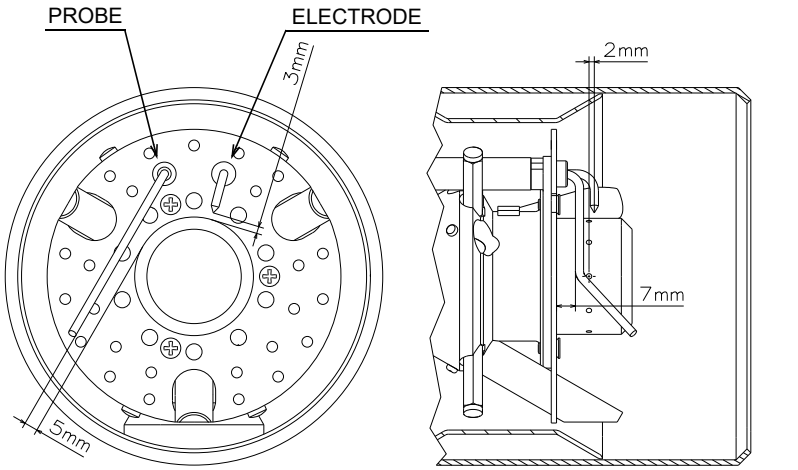

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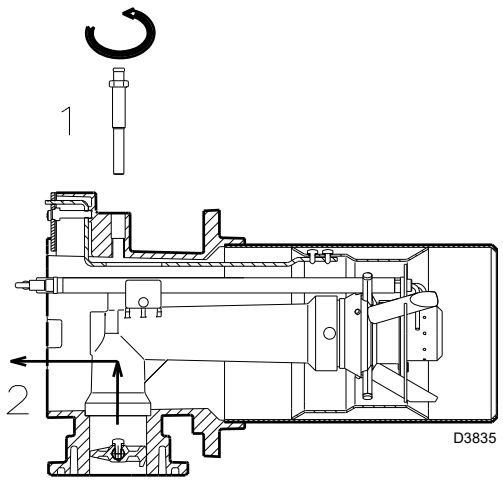


(E)

INSTALLATION

THE BURNER MUST BE INSTALLED IN CONFORMITY WITH LEGISLATION AND LOCAL STANDARDS.

WORKING POSITION (A)

The burner is designed to work only in the positions **1**, **2**, **3 and 4**.

Installation **1** is preferable, as it is the only one that allows the maintenance operations as described in this manual. Installations **2**, **3 and 4** allow the working, but make the operations of maintenance and checking of the combustion head more difficult page 16.

Any other position could compromise the correct working of the appliance.

Installation **5** is forbidden, for safety reasons.

BOILER PLATE (B)

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

BLAST TUBE LENGTH (C)

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

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

Blast tube 10	RS 25/M BLU	RS 35/M BLU
• short	230	230
• long	365	365

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

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

For boilers with a water-cooled frontpiece, a heat-resistant cover is not necessary 11)-12)(C), unless expressly requested from the boiler manufacturer.

FIXING THE BURNER TO THE BOILER (C)

Before fixing the burner to the boiler, check (from the opening of the blast tube) that the probe and the electrode are correctly positioned, as in (D).

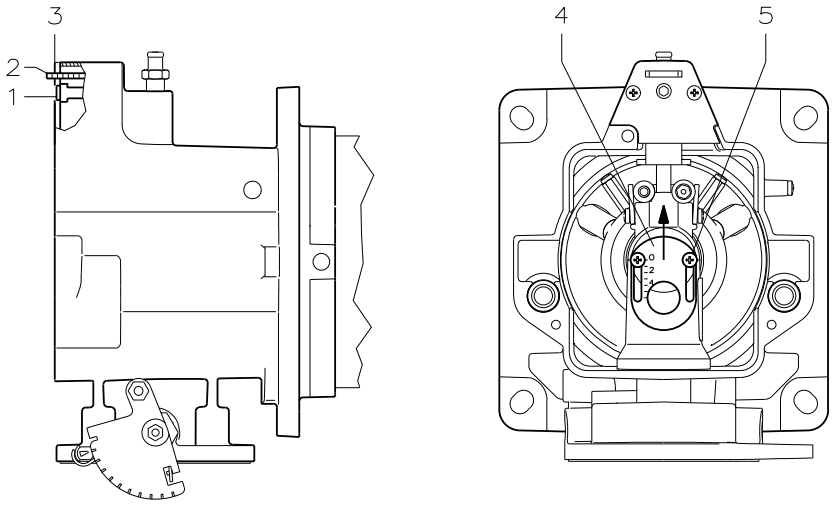
Separate the combustion head from the rest of the burner, fig. (C):

- disengage the articulated coupling 4) from the graduated sector 5);
- remove the 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 probe and electrode leads, then unthread the burner completely from the guides.

Fix the unit 9)(C) to the boiler plate, inserting the supplied insulating gasket 6)(C). Use the 4 screws, also supplied with the unit, after first protecting the thread with an anti-locking product. The seal between burner and boiler must be airtight.

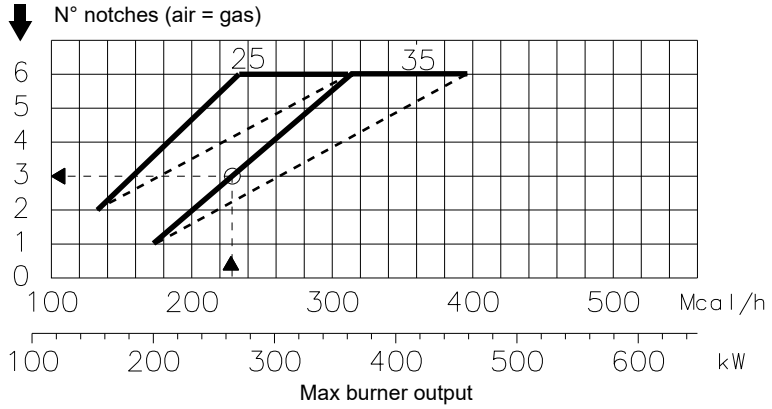
If, in the previous check, the position of the probe or electrode was not correct, remove the screw 1)(E), extract the inner part 2)(E) of the head, and adjust them. Do not rotate the probe: leave it as in (D). If it is located too close to the ignition electrode, the control box amplifier may be damaged.

ATTENTION
Proceed with the assembly of the inner part 2)(E) of the combustion head, tightening the screw 1)(E) with a tightening torque of **4 ÷ 6 Nm**.



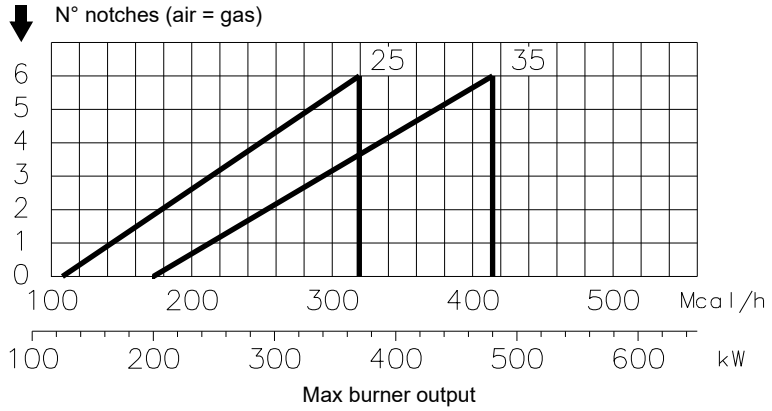
(A) D8458

COMBUSTION HEAD SETTING

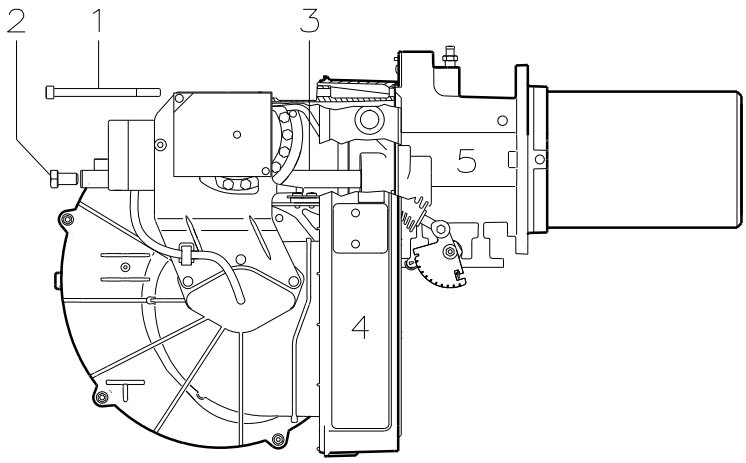


(B) D3908

CENTRAL AIR ADJUSTMENT



(C) D8737



(D) D3838

COMBUSTION HEAD SETTING

Installation operations are now at the stage where the blast tube and sleeve are secured to the boiler as shown in fig. (A). It is therefore particularly easy to adjust the combustion head.

Air adjustment (A - B)
Rotate the screw 1)(A) until the notch on the lamina 2)(A) corresponds with the surface of the plate 3)(A).

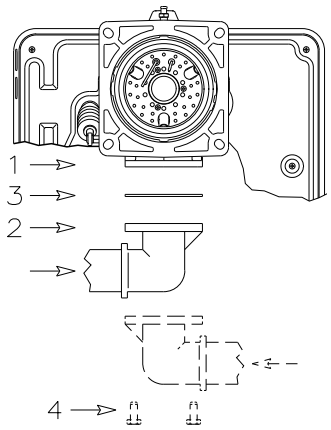
Example:
RS 35/M BLU burner, output = 270 kW.
From diagram (B) you can see that, for the MAX output of 270 kW, the air should be adjusted at notch 3, subtracted from the value of the pressure in the chamber. In this case, the loss of pressure in the combustion head is shown in column 1 on page 5.

Note
If the pressure in the chamber is equal to 0 mbar, the air is adjusted with reference to the broken line of the diagram (B).

Central air adjustment (A - C)
n case the application needs a particular setup, it is possible to modify the central air delivery using the ring nut 4)(A) up to the notch indicated in diagram (C).
In order to carry out this operation, unscrew the screws 5)(A) and lift up the ring nut 4)(A). At the end, tighten the screws 5)(A) again.

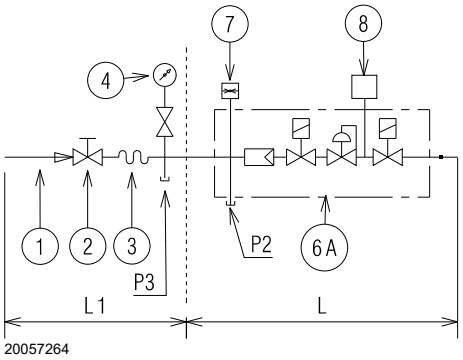
Once you have finished adjusting the head, reassemble the burner 4)(D) on the guides 3)(D) at about 100mm from the pipe coupling 5)(D) - burner in the position shown in fig. (C)p. 7 - insert the cable of the probe and the cable of the electrode, then slide the burner as far as the pipe coupling, burner in the position shown in fig. (D).
Refit screws 2) on guides 3).
Fix the burner to the pipe coupling with the screw 1).

Important
When fitting the burner on the two slide bars, it is advisable to gently draw out the high tension cable and flame detection probe cable until they are slightly stretched.



(A) D3839

MB



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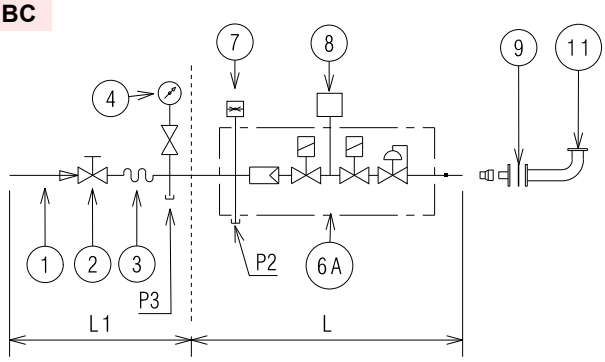

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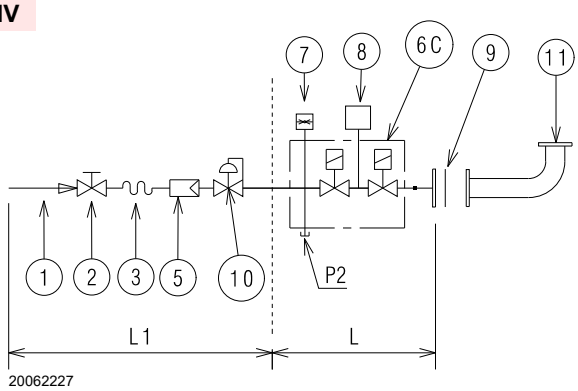
DMV



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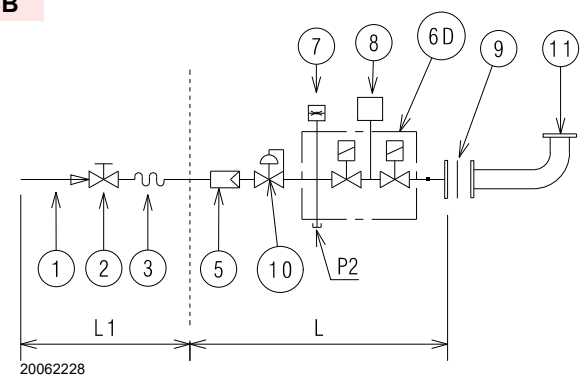
CB



(B) 20062228

GAS FEEDING LINE

WARNING

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

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

Precautions: avoid knocking, attrition, sparks and heat.

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

- The gas train must be connected to the gas attachment 1)(A), using flange 2), gasket 3) and screws 4) supplied with the burner.
- The gas train can enter the burner from the right or left side, depending on which is the most convenient, see fig.(A).
- The gas solenoids must be as close as possible to the burner, to ensure that the gas reaches the combustion head within the safety time of 3s.

GAS TRAIN

Approved, together with the burner, according to the regulation EN 676, and supplied separately from the burner.

KEY TO LAYOUT(B)

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

6C Includes
- safety valve
- working valve

6D Includes:
- safety valve
- working valve
- pressure adjuster
- filter

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

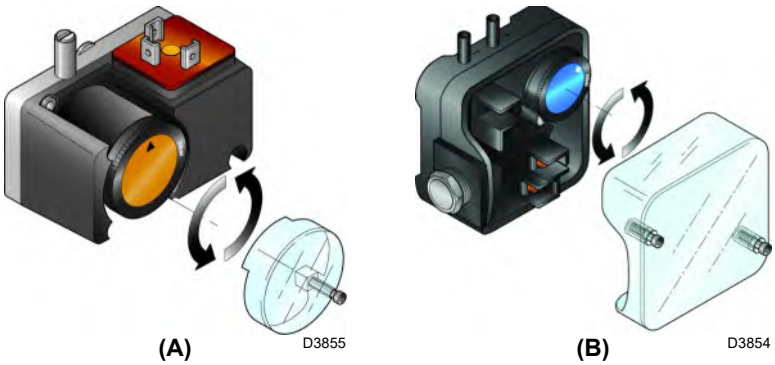
Note

See the accompanying instructions for the adjustment of the gas train.

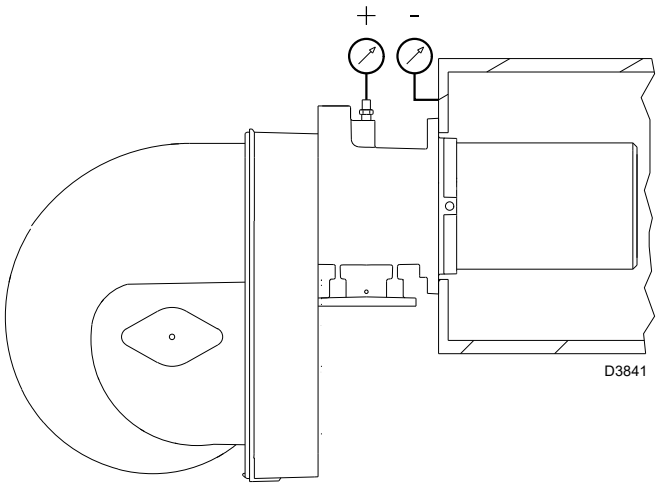
To select the correct model of the gas train, refer to the “burner-gas train combination” manual supplied.

MIN GAS PRESSURE SWITCH

AIR PRESSURE SWITCH



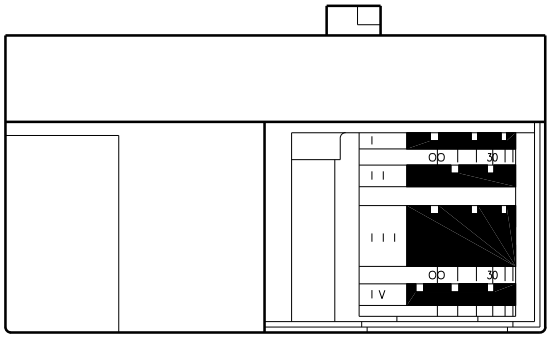
(A) D3855 (B) D3854



D3841

(C)

SERVOMOTOR



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(D)

ADJUSTMENTS PRIOR TO IGNITION

ATTENTION

THE FIRST IGNITION MUST BE CARRIED OUT BY QUALIFIED PERSONNEL WITH THE RIGHT INSTRUMENTS.

ATTENTION
Refer to paragraph “Safety test - with gas ball valve closed” on page 17 before the first start-up.

The adjustment of the combustion head, air, was described on page 8.
In addition, the following adjustments must also be made:

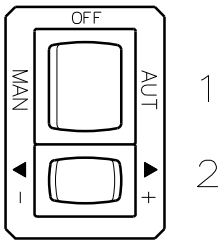
- open manual valves up-line from the gas train.
- Adjust the minimum gas pressure switch to the start of the scale (A).
- Adjust the air pressure switch to the start of the scale (B).
- Purge the air from the gas line.
  Continue to purge the air (we recommend using a plastic tube routed outside the building) until gas is smelt.
- Assemble a pressure gauge (C) on the gas pressure socket of the pipe coupling.
  The manometer readings are used to calculate MAX. burner power using the tables on page 6.
- Connect two lamps or testers to the two gas line solenoid valves VR and VS, to check the exact moment at which voltage is supplied.
  This operation is unnecessary if each of the two solenoid valves is equipped with a pilot light that signals voltage passing through.

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

SERVOMOTOR (D)

The servomotor provides simultaneous adjustment of the air damper, by means of the variable profile cam and the gas butterfly valve.
The angle of rotation of the servomotor is equal to the angle on the graduated sector controlling the gas butterfly valve.
The servomotor rotates through 90° degrees in 24 seconds.
Do not alter the factory setting for the 4 cams; simply check that they are set as indicated below:

Cam I : 90°
Limits rotation toward maximum position. When the burner is at max output, the gas butterfly valve must be fully open: 90°.
Cam I I : 0°
Limits rotation toward the minimum position.
When the burner is shut down, the air damper and gas butterfly valve must be closed: 0°.
Cam I I I : 15°
Adjusts the ignition position and the MIN output.
Cam I V : Integral with cam III



(A) D3833

In the event of a burner lockout, more than two consecutive burner reset operations could cause damage to the installation. On the third lockout, contact the Aftersales Service.

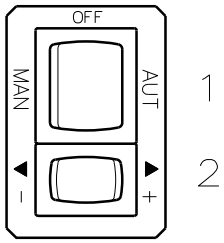
If further lockouts or burner faults occur, interventions must only be made by qualified, authorised personnel (as indicated in this manual, and in compliance with the laws and regulations currently in force).

BURNER START-UP

Switch off the remote controls and place the switch 1)(A) in position “MAN”.
As soon as the burner starts, check the direction of rotation of the fan blade, looking through the flame inspection window 17)(A)p.4. Make sure that the lamps or testers connected to the solenoids, or pilot lights on the solenoids themselves, indicate that no voltage is present. If voltage is present, stop the burner immediately and check the electrical connections.

BURNER IGNITION

Having completed the checks indicated in the previous heading, ignition of the burner should be achieved. If the motor starts but the flame does not appear and the control box goes into lockout, reset and wait for a new firing attempt. If ignition is still not achieved, it may be that gas is not reaching the combustion head within the safety time period of 3 seconds. In this case, increase gas ignition delivery. The arrival of gas to the pipe coupling is shown by the pressure gauge (C) p.10. Once ignition has taken place, proceed with global calibration operations.



(A)

BURNER CALIBRATION

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

Adjust successively:
1 - Output upon ignition (minimum)
2 - Max. burner output
3 - Intermediate outputs between Min. and Max.
4 - Air pressure switch
5 - Minimum gas pressure switch

DETERMINATION OF OUTPUT UPON IGNITION (MINIMUM)

According to the regulation EN 676.

Burners with MAX output up to 120kW

Ignition can be performed at the maximum operation output level. Example:
- max. operation output : 120 kW
- max. ignition output : 120 kW

Burners with MAX output above 120kW

Ignition must be performed 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 regulations prescribe that the value be defined according to the control box safety time "ts":
for "ts" = 3s, ignition output must be equal to, or lower than, 1/3 of max. operation output.

Example
MAX operation output of 450 kW.
The ignition output must be equal to, or less than, 150kW with ts = 3s

In order to measure the ignition output:
- disconnect the plug-socket 24)(A)p.4 on the ionisation probe cable (the burner will fire and then go into lockout after the safety time has elapsed).
- Perform 10 ignitions with consecutive lockouts.
- Read, on the meter, the quantity of gas burned.
  This quantity must be equal to, or lower than, the quantity given by the formula, for ts = 3s:

$$\mathbf{Vg = \frac{Qa\ (max.\ burner\ output)\ x\ n\ x\ ts}{3600}}$$

Vg: volume supplied in ignitions carried out (Sm^3)
Qa: ignition output (Sm^3/h)
n: number of ignitions (10)
ts: safety time (sec)

Example for gas G 20 (9.45 kWh/Sm^3):
ignition output 150 kW
corresponding to 15.87 Sm^3/h.
After 10 ignitions with lockout, the output indicated on the meter must be equal to, or less than:

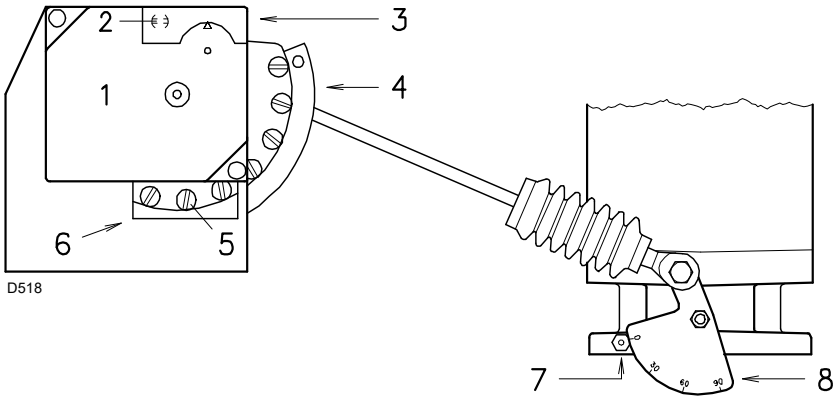
$$\mathbf{Vg = \frac{15.87\ x\ 10\ x\ 3}{3600} = 0.132\ Sm^3}$$

1 - OUTPUT UPON IGNITION (MINIMUM)

Min output must be selected within the firing rate range shown on page 5.
Press the button 2)(A) “output reduction”, and keep it pressed until the servomotor has closed the air damper and the gas butterfly valve at 15° (adjustment made in the factory).

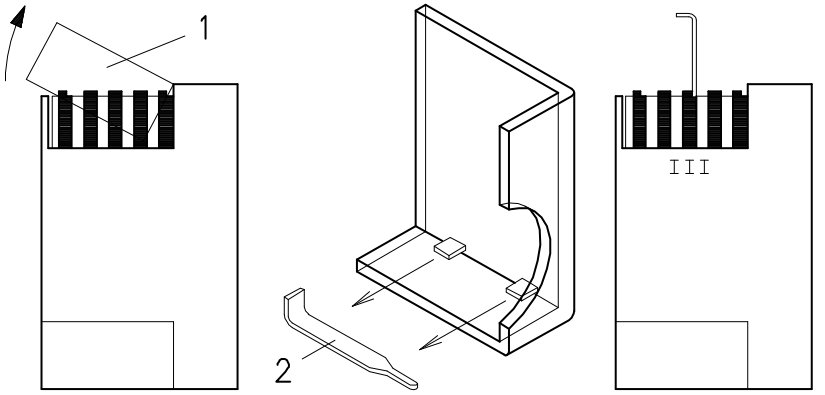
Adjusting gas delivery

Measure the gas delivery at the meter.
- If it is necessary to reduce it, reduce slightly the angle of cam III fig.(B)p.13 with small, regular movements, i.e. bring it from an angle of 15° to 13° - 11°....
- If it is necessary to increase it, press slightly the button “output increase” 2)(A) (open by 10-15° the gas butterfly valve), increase the angle of cam III fig.(B)p.13 with small, regular movements, i.e. bring it from an angle of 15° to 17° - 19°....
  Then press the button “output reduction” until the servomotor is in the position of minimum opening, and measure the gas output.



1 Servomotor
2 ⊖ Constraint / ⊕ Release of cam 4
3 Cam cover
4 Variable profile cam
5 Screws for adjusting the variable profile
6 Slit to access the screws 5
7 Index of graduated sector 8
8 Gas butterfly valve graduated sector

(A)



(B)

NOTE
The servomotor follows the adjustment of cam III only when the angle of the cam is reduced. If it is necessary to increase the angle of the cam, you must first increase the angle of the servomotor by means of the “output increase” key, then increase the angle of cam III, and finally bring the servomotor to the position of MIN output, with the “output reduction” key.

If it is necessary to adjust cam III, remove the cover 1) (inserted with a trigger catch, as indicated in fig. (B), extract the special key 2) from inside, and insert it in the notch of cam III.

Adjustment of air delivery
Progressively adjust the starting profile of cam 4)(A) by turning the screws working through the access hole 6)(A). It is preferable not to turn the first screw since this is used to set the air damper to its fully closed position.

2 - MAX. OUTPUT
Max. output of the burner must be set within the firing rate range shown on page 5.
In the above description, we left the burner switched on, working at MIN output. Now press the button 2)(A)p.12 “output increase”, and keep it pressed until the servomotor has opened the air damper and the gas butterfly valve at 90°.
Adjusting gas delivery
Measure the gas delivery at the meter.
As a general rule, it can be seen from the table on page 6, just read the gas pressure on the pressure gauge, see fig.(C)p.10, and follow the indications given on page 6.
- If delivery needs to be reduced, diminish outlet gas pressure and, if it is already very low, slightly close adjustment valve VR.
- If delivery needs to be increased, increase outlet gas pressure.

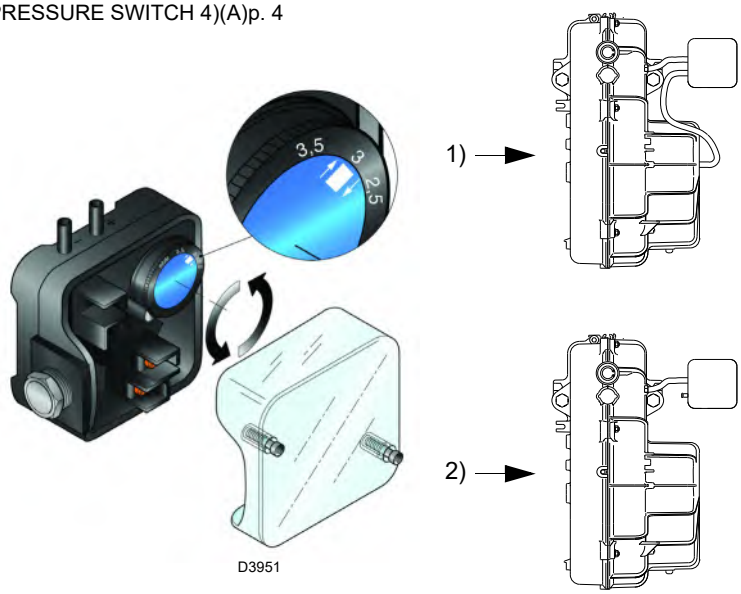
Adjustment of air delivery
Progressively adjust the end profile of cam 4)(A) by turning the cam adjustment screws as they appear through the access opening 6)(A).
- Turn the screws clockwise to increase air delivery.
- Turn the screws anti-clockwise to reduce air delivery.

3 - INTERMEDIATE OUTPUTS
Adjusting gas delivery
No adjustment of gas delivery is required.

Adjustment of air delivery
Press the key 2)(A)p.12 “output increase” a little so that a new screw 5)(A) appears in the opening 6)(A). Adjust it until optimal combustion is obtained. Proceed in the same way with the other screws.
Take care that the cam profile variation is progressive.
Switch the burner off with the switch 1)(A)p.12.
Release the variable profile cam by putting the servomotor slot 2)(A) in a vertical position and check more than once, rotating the cam forward and backward by hand, that the movement is soft and smooth, without sticking.
As far as is possible, try not to move those screws at the ends of the cam that were previously adjusted for the opening of the air damper to MAX and MIN output.

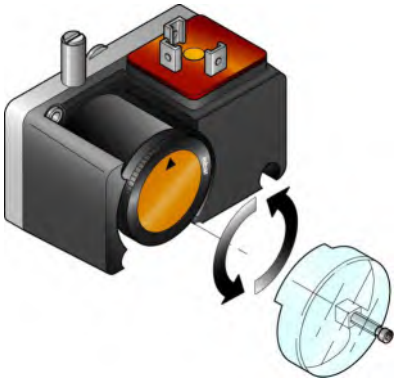
NOTE
Once you have finished adjusting outputs MAX - MIN - INTERMEDIATE, check ignition once again: noise emission at this stage must be identical to the following stage of operation. If you notice any sign of pulsations, reduce the ignition stage delivery.

AIR PRESSURE SWITCH 4)(A)p. 4

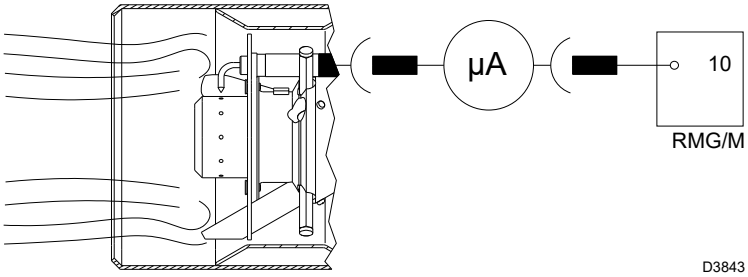


(A)

MINIMUM GAS PRESSURE SWITCH



(B)



(C)

4 - AIR PRESSURE SWITCH (A)

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

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

Then slowly turn the appropriate knob clockwise until the burner reaches the lockout position.

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

Now check the correct start-up of the burner.

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

The incorporated air pressure switch can work in a "differential" way if connected with two pipes; see1)(A). If a strong depression in the combustion chamber during the pre-purging phase does not allow the air pressure switch to commute, commutation 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.

5 - MINIMUM GAS PRESSURE SWITCH (B)

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

Then turn the knob anti-clockwise by 5mbar and repeat burner starting to ensure it is uniform.

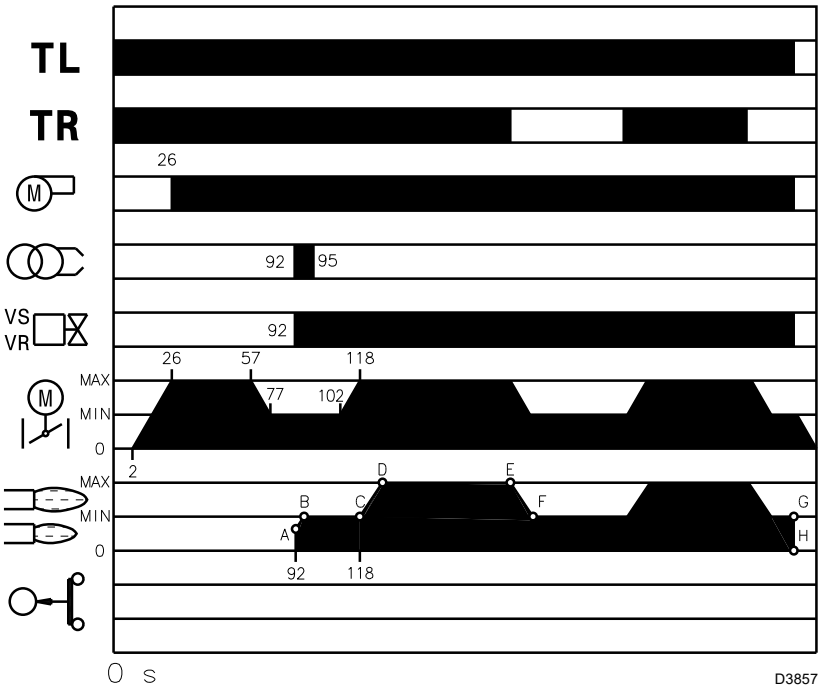
If the burner locks out again, turn the knob anti-clockwise again by 1mbar.

FLAME PRESENCE CHECK (C)

The burner is fitted with an ionisation system which ensures that a flame is present. The minimum current for control box operation is 6 µA. The burner provides a much higher current, so controls are not normally required. However, if it is necessary to measure the ionisation current, disconnect the plug-socket 24)(A)p.4 on the ionisation probe cable and insert a direct current microammeter with a base scale of 100 µA. Carefully check polarities.

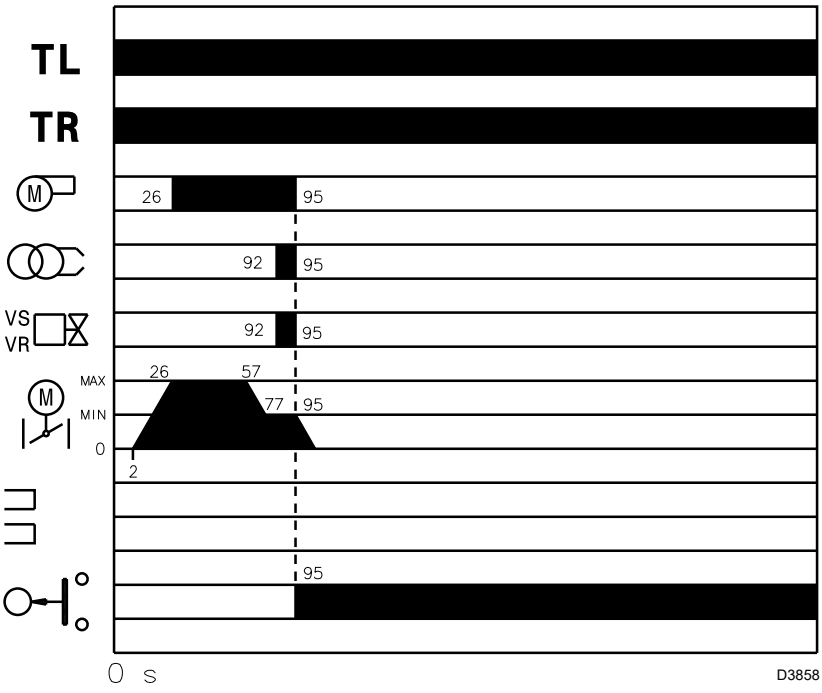
1 kPa = 10 mbar

STANDARD IGNITION
(n° = seconds from the moment 0)



(A)

IGNITION FAILURE



(B)

BURNER OPERATION

BURNER START-UP (A)

- 0s: Closure of thermostat/pressure switch TL.
- 2s: Start of electrical control box programme. Servomotor starts: rotate to the left by 90°, i.e. until the contact intervenes with cam I (D)p. 10.
- 26s: The air damper arrives to the MAX. output position.
  The fan motor starts up.
  Start of the pre-purging phase.
- 57s: The servomotor rotates towards the right, as far as the angle set on cam III (D)p. 10 for MIN. output.
- 77s: The air damper and the gas butterfly valve adopt the MIN output position (with cam III)(D)p.10 at 15°).
- 92s: Ignition electrode strikes a spark.
  The safety valve VS opens, along with the adjustment valve VR, quick opening. The flame is ignited at a low output level, point A.
  Delivery is then progressively increased, with the valve VR opening slowly up to MIN. output, point B.
- 94s: The spark goes out.
- 118s: The start-up cycle ends.

STEADY STATE OPERATION (A)

Burner without modulating operation kit

Once the start-up cycle is completed, the servomotor command moves on to the thermostat/pressure switch TR that controls the pressure or the temperature in the boiler, point C.
(The electrical control box still continues to check the presence of the flame and the correct position of the air and gas pressure switches).

- If the temperature or the pressure is low, so the thermostat/pressure switch TR is in the output request position, the burner progressively increases the output up to the MAX value (tract C-D).
- If the temperature or the pressure increases until the commutation of TR, the burner progressively reduces the output up to the MIN value (tract E-F). And so on.
- The burner locks out when demand for heat is less than the heat supplied by the burner at min. output, (section G-H). The thermostat/pressure switch TL opens, and the servomotor returns to the angle 0°. The damper closes completely to reduce thermal dispersions to a minimum.

Burner with modulating operation kit

See the handbook enclosed with the regulator.

IGNITION FAILURE (B)

If the burner does not switch on, the gas valve goes into lockout within 3s of the opening.

BURNER FLAME GOES OUT DURING OPERATION

If the flame goes out by accident during the operation, the burner goes into lockout within 1s.

FINAL CHECKS (with the burner working):
- disconnect a wire of the minimum gas pressure switch;
- switch on the thermostat/pressure switch TL;
- switch on the thermostat/pressure switch TS;

the burner must stop.
- disconnect the air adduction tube of the pressure switch;
- disconnect the wire of the ionisation probe;

the burner must stop in lockout.
Make sure that the mechanical locking systems on the various adjustment devices are fully tightened.

MAINTENANCE

The burner requires periodic maintenance carried out by a qualified and authorised technician **in conformity with legislation and local standards**.

Periodic maintenance is essential for the reliability of the burner, avoiding the excessive consumption of fuel and consequent pollution.

Before carrying out any cleaning or control, always switch off the electrical supply to the burner, using the main switch of the system.

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

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

Gas filter
Substitute the gas filter when dirty (see train instructions).

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

Servomotor
Release the cam 4)(A)p.13, rotating by 90° the notch 2)(A)p.13, and manually check that it rotates smoothly backwards and forwards. Constrain the cam again 4)p.13.

Burner
Check for excess wear or loose screws in the mechanisms that control the air damper and the gas butterfly valve. In addition, the screws that fix the cables in the terminal board must be blocked, along with the burner sockets.
Clean the outside of the burner, taking special care with the transmission joints and cam 4)(A)p.13.

Combustion
Adjust the burner if the combustion values found at the beginning of the operation do not comply with the regulations in force, or at any rate, do not correspond to good combustion.
Use the appropriate card to record the new combustion values; they will be useful for subsequent controls.

SAFETY COMPONENT	LIFE CYCLE
Flame control	10 years or 250.000 operation cycles
Flame sensor	10 years or 250.000 operation cycles
Gas valves (solenoid)	10 years or 250.000 operation cycles
Pressure switches	10 years or 250.000 operation cycles
Pressure adjuster	15 years
Servomotor (electronic cam) (if present)	10 years or 250.000 operation cycles
Oil valve (solenoid)(if present)	10 years or 250.000 operation cycles
Oil regulator (if present)	10 years or 250.000 operation cycles
Oil pipes/ couplings (metallic) (if present)	10 years
Flexible hoses (if present)	5 years or 30.000 pressurised cycles
Fan impeller	10 years or 500.000 start-ups

(A)

SAFETY TEST - WITH GAS BALL VALVE CLOSED

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

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

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

The start-up cycle must be as follows:

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

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

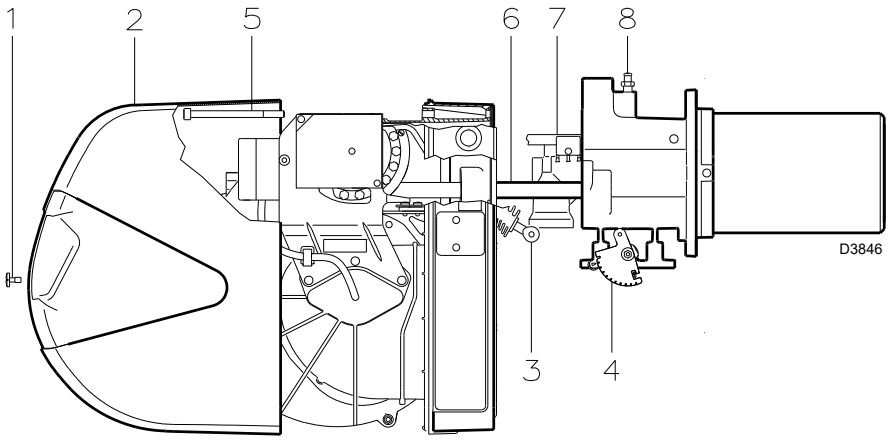
The actual electrical supply of the solenoid gas valves can be verified by inserting a tester.
Some valves are equipped with light signals (or close/open position indicator) that turn on at the same time as their power supply.

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

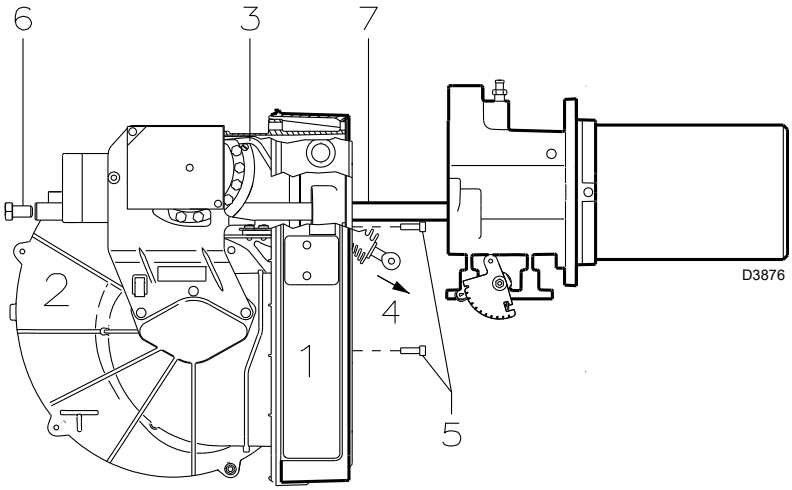
SAFTEY COMPONENTS

The safety components must be replaced at the end of their life cycle indicated in table (A).
The specified life cycles do not refer to the warranty terms indicated in the delivery or payment conditions.

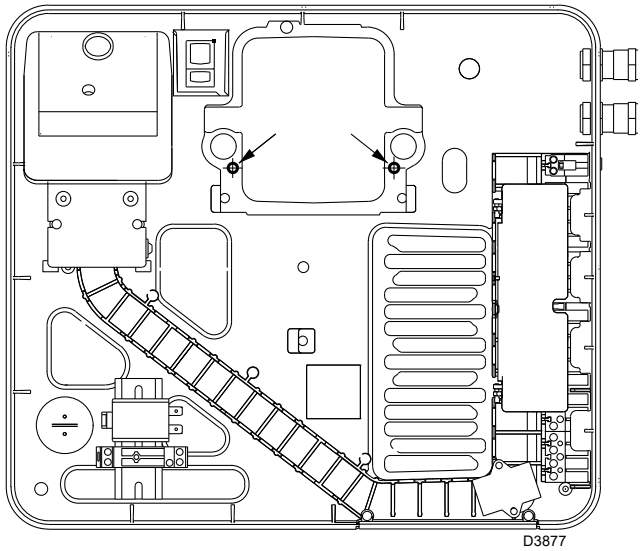
OPENING THE BURNER



(A)



(B)



(C)

TO OPEN THE BURNER (A):

- Switch off the electrical power.
- Remove the screw 1) and pull out the hood 2).
- Disengage the articulated coupling 3) from the graduated sector 4).
- Remove the screw 5) only with the long head models; pull the burner back on the guides 6) for about 100mm. Disconnect the probe and electrode leads and then pull the burner fully back.

Now extract the gas distributor 7) after having removed the screw 8).
Remove the screws 2)(B)p.7 and tighten the two extensions 25)(A)p.4 supplied with the burner.
Retighten the two screws 2)(B)p.7 on the terminal of the extensions.

ATTENTION
Proceed with the assembly of the inner part of the combustion head, tightening the screw 8)(A) with a tightening torque of **4 ÷ 6 Nm**.

TO CLOSE THE BURNER (A):

- Push the burner up to approximately 100 mm from the pipe coupling.
- Reconnect the leads and slide in the burner until it comes to a stop.
- Replace the screw 5) and carefully pull the probe and electrode cables outwards until they are slightly taut.
- Re-couple the articulated coupling 3) to the graduated sector 4).
- In the long head models, unscrew the extensions and reposition them in the appropriate space; tighten the screws to the guides 2)(C)p.7.
- Reposition the hood 2) and fix with the screw 1).

SWITCHBOARD MAINTENANCE

If it is necessary to carry out maintenance on the switchboard 1)(B), it is possible to remove only the fan unit 2)(B), to allow improved access to the electrical components.
With the burner open as in fig. (A), unhook the tie-rod 3)(B), removing the screw on the variable profile cam, and extract it from the tip 4)(B).
At this point, disconnect the cables relating to the air pressure switch, the servomotor and fan motor.
Remove the 3 screws 5)(B) positioned on the protective cover.
Removing the 2 screws 6)(B), it is possible to unthread the fan unit 2)(B) from the guides 7)(B).
Finally, you can use 2 of the 3 screws 5)(B) to fix the electrical switchboard to the pipe coupling, in the points indicated in fig. (C), and then carry out the maintenance operations.

BURNER START-UP CYCLE DIAGNOSTICS

During start-up, the indications are explained in the following table:

COLOUR CODE TABLE	
Sequences	**Colour code**
Pre-purging	●●●●●●●●●
Ignition phase	●○●○●○●○●
Operation, flame OK	□□□□□□□□□
Operation with weak flame signal	□○□○□○□○□
Electrical supply lower than ~ 170V	●▲●▲●▲●▲●
Lockout	▲▲▲▲▲▲▲▲▲
Extraneous light	▲□▲□▲□▲□▲
Key to layout: ○ Off ● Yellow □ Green ▲ Red	

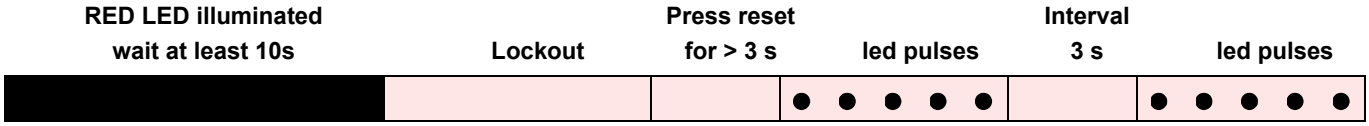
RESET OF CONTROL BOX AND DIAGNOSTICS USE

The control box supplied features a diagnostics function, through which any causes of malfunctioning can be easily identified (indicator: **RED LED** signal).

To use this function, wait at least 10 seconds from when the safety condition has been set (**lockout**), then press the reset button.

The control box generates a sequence of led pulses (1 second apart) that is repeated at constant intervals of 3 seconds.

Once the number of LED pulses has been visualised, and the possible cause identified, it is necessary to reset the system, keeping the button pressed for 1-3 seconds.



Below, a list of the possible methodologies for carrying out the resetting of the control box and for using the diagnostics.

CONTROL BOX RESET

To reset the control box, proceed as follows:

- Press and hold the button for 1-3 seconds.
  The burner starts up again, 2 seconds after the button is released. If the burner does not restart, make sure the limit thermostat is closed.

In the event of a burner lockout, more than two consecutive burner reset operations could cause damage to the installation. On the third lockout, contact the Aftersales Service.

If further lockouts or burner faults occur, interventions must only be made by qualified, authorised personnel (as indicated in this manual, and in compliance with the laws and regulations currently in force).

VISUAL DIAGNOSTICS

Indicate the type of burner fault that leads to the lockout.

To display the diagnostic, proceed as follows:

- Keep the button pressed for more than 3 seconds from when the red LED (burner lockout) switches on.
  The end of the operation will be shown by a yellow led pulse.
  Release the button when you see the flashing. The number of flashes indicates the cause of the malfunctioning, on the basis of the code given in the table on page 20.

SOFTWARE DIAGNOSTICS

Gives an analysis of the life of the burner, through optical connections with a PC showing the working hours, number and types of lockout, control box serial number etc.

To display the diagnostic, proceed as follows:

- Keep the button pressed for more than 3 seconds from when the red LED (burner lockout) switches on.
  The end of the operation will be shown by a yellow led pulse.
  Release the button for 1 second, then press it again for more than 3 seconds, until you see another yellow flash.
  When you release the button, the red led will flash intermittently with high frequency: only then is it possible to insert the optical connection.

When the operation is completed, it is necessary to reset the start-up condition of the control box, using the reset procedure described above.

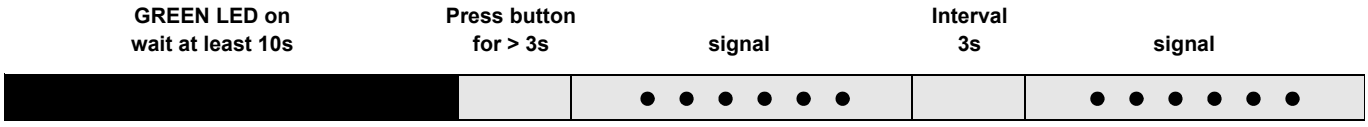
PRESSURE ON THE BUTTON	STATE OF CONTROL BOX
From 1 to 3 seconds	Reset of the control box without visualisation of the visual diagnostics.
More than 3 seconds	Visual diagnostics of the lockout condition: (led flashes at 1 second intervals).
More than 3 seconds, starting from the condition of visual diagnostics	Software diagnostics, with the help of optical interface and PC (possibility to visualise the working hours, irregularities, etc.)

The sequence of led pulses issued by the control box identifies the possible types of fault, which are listed in the table on page 20.

Signal	Problem	Possible cause	Recommended remedy
2 blinks ● ●	Once the pre-purging phase and safety time have passed, the burner goes into lockout without the appearance of the flame	1 - The operation solenoid lets little gas through	Increase
		2 - One of the two solenoid valves does not open.	Replace
		3 - Gas pressure too low	Increase pressure at governor
		4 - Ignition electrode incorrectly adjusted	Adjust
		5 - Electrode grounded due to broken insulation	Replace
		6 - High voltage cable defective	Replace
		7 - High voltage cable deformed by high temperature	Replace and protect
		8 - Ignition transformer defective.	Replace
		9 - Incorrect valve or transformer electrical wiring	Check
		10 - Defective control box	Replace
		11 - A closed valve upline the gas train	Open
		12 - Air in pipework	Bleed air
		13 - Gas valves unconnected or with interrupted coil	Check connections or replace coil
3 blinks ● ● ●	The burner does not switch on, and the lockout appears	14 - Air pressure switch in operating position	Adjust or replace
	The burner switches on, but then stops in lockout	- Air pressure switch inoperative due to insufficient air pressure:	
		15 - Air pressure switch incorrectly adjusted.	Adjust or replace
		16 - Pressure switch pressure test point pipe blocked	Clean
		17 - Poorly adjusted head	Adjust
		18 - High pressure in the furnace	Connect air pressure switch to fan suction line
	Lockout during pre-purging phase	19 - Defective motor control contactor (only three-phase version)	Replace
		20 - Defective electrical motor.	Replace
		21 - Motor lockout (defective electrical motor)	Replace
4 pulses ● ● ● ●	The burner switches on, but then stops in lockout	22 - Flame simulation	Replace the control box
	Lockout when burner stops	23 - Permanent flame in the combustion head or flame simulation	Eliminate persistence of flame or replace control box
6 blinks ● ● ● ● ● ●	The burner switches on, but then stops in lockout	24 - Defective or incorrectly adjusted servomotor.	Adjust or replace
7 blinks ● ● ● ● ● ● ●	The burner goes into lockout immediately following the appearance of the flame	25 - The operation solenoid lets little gas through	Increase
		26 - Ionisation probe incorrectly adjusted	Adjust
		27 - Insufficient ionisation (less than 5 A)	Check probe position
		28 - Earth probe	Withdraw or replace cable
		29 - Burner poorly grounded	Check grounding
		30 - Phase and neutral connections inverted	Invert them
		31 - Defective flame detection circuit	Replace the control box
	Burner locks out when shifting from minimum to maximum output and vice versa	32 - Too much air or too little gas	Adjust air and gas
	Burner goes into lockout during operation	33 - Probe or ionisation cable grounded	Replace worn parts
10 blinks ● ● ● ● ● ● ● ● ● ●	The burner does not switch on, and the lockout appears	34 - Incorrect electrical wiring	Check
	The burner goes into lockout	35 - Defective control box	Replace
		36 - Presence of electromagnetic disturbances in the thermostat lines	Filter or eliminate
		37 - Presence of electromagnetic disturbance	Use the radio disturbance protection kit
No blink	The burner does not start	38 - No electrical power supply	Close all switches - Check connections
		39 - A limiter or safety control device is open	Adjust or replace
		40 - Line fuse blocked	Replace
		41 - Defective control box	Replace
		42 - No gas supply	Open the manual valves between contactor and train
		43 - Mains gas pressure insufficient	Contact your GAS COMPANY
		44 - Minimum gas pressure switch fails to close.	Adjust or replace
		45 - Servomotor fails to move to min. ignition position	Replace
	The burner continues to repeat the start-up cycle, without lockout	46 - The gas pressure in the gas mains lies very close to the value to which the minimum 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 comes to a halt. Pressure increases again, the pressure switch closes again and the ignition cycle is repeated. And so on	Reduce the minimum gas pressure switch intervention pressure. Replace the gas filter cartridge.
	Ignition with pulsations	47 - Poorly adjusted head	Adjust
		48 - Ignition electrode incorrectly adjusted	Adjust
		49 - Incorrectly adjusted fan air damper: too much air	Adjust
		50 - Output during ignition phase is too high.	Reduce
	Burner does not reach maximum output	51 - Remote control device TR fails to close.	Adjust or replace
		52 - Defective control box	Replace
		53 - Defective servomotor	Replace
	Burner stops with air damper open	54 - Defective servomotor	Replace

NORMAL OPERATION / FLAME DETECTION TIME

The control box has a further function to guarantee the correct burner operation (signal: **GREEN LED** permanently on).
To use this function, wait at least ten seconds from the burner ignition and then press the control box button for a minimum of 3 seconds.
After releasing the button, the GREEN LED starts flashing as shown in the figure below.



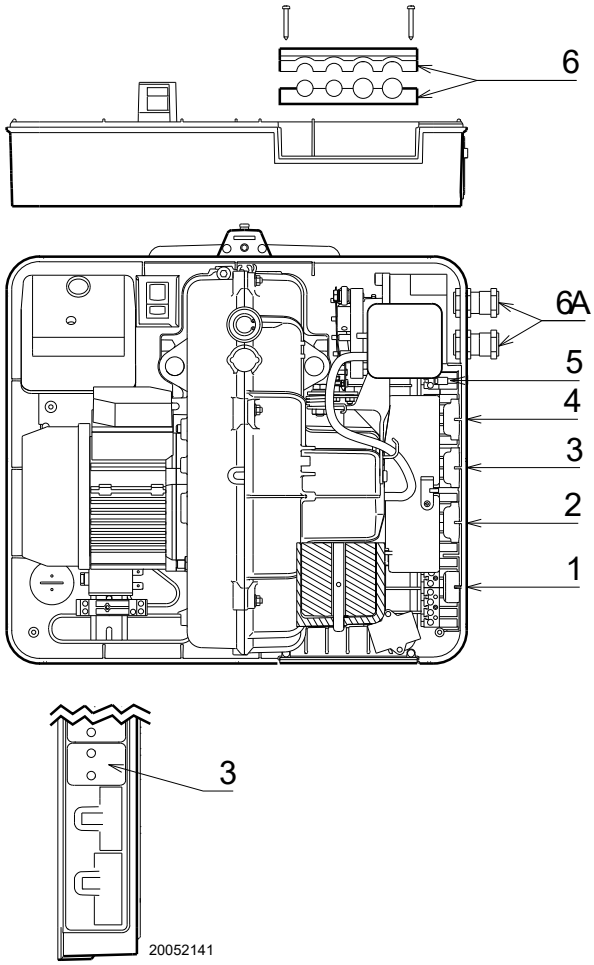
The pulses of the LED constitute a signal spaced by approximately 3 seconds.
The number of pulses will measure the probe DETECTION TIME since the opening of gas valves, according to the following table:

SIGNAL	FLAME DETECTION TIME
1 blink ●	0.4s
2 blinks ● ●	0.8s
6 blinks ● ● ● ● ● ●	2.8s

This is updated in every burner start-up.
Once read, the burner repeats the start-up cycle by briefly pressing the control box button.
WARNING
If the result is > 2s, ignition will be retarded.
Check the adjustment of the hydraulic brake of the gas valve, the air damper and the combustion head adjustment.

KIT INTERFACE ADAPTER RMG TO PC Code **3002719**

APPENDIX



Electrical connections

NOTES

The electrical wirings must be carried out in conformity with the regulations in force in the countries of destination, and by qualified personnel.
Riello S.p.A. cannot accept any responsibility for modifications or connections other than those shown in these diagrams.

Use flexible cables, in accordance with the regulation EN 60 335-1.

All the cables to be connected to the burner must pass through cable grommets.

The use of cable grommets can take various forms; the following way is just one possible solution:

RS 25-35/M BLU single phase

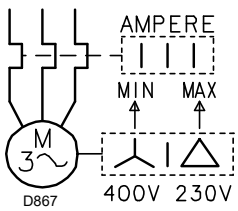
1- 7 pole socket for single phase power supply, thermostat/ pressure switch TL
2- 6 pole socket for gas valves, gas pressure switch or device for checking the valve seal
3- 4 pole socket for thermostat/pressure switch TR (with removable cover)
4- 5 pole socket, not used
5- 2-pole socket for max gas pressure switch accessory
6 - 6A Fittings for pipe unions
(Pierce, if it is necessary to use the pipe unions 6A)

RS 35/M BLU three phase

1- 7 pole socket for single-phase power supply, thermostat/ pressure switch TL
2- 6 pole socket for gas valves, gas pressure switch or device for checking the valve seal
3- 4 pole socket for thermostat/pressure switch TR (with removable cover)
4- 5 pole socket for three phase power supply
5- 2-pole socket for max gas pressure switch accessory
6 - 6A Fittings for pipe unions
(Pierce, if it is necessary to use the pipe unions 6A)

DANGER

The socket cover must only be removed when the 4-pole socket is in use.
When the 4-pole socket is not in use the cover must be in place.
The manufacturer furthermore declines any and every responsibility for the failure to observe the contents of this manual.



ADJUSTMENT OF THERMAL RELAY (RS 35/M BLU THREE PHASE)

Used to avoid the burning of the motor owing to a strong increase in the absorption, caused by the lack of a 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”.

If the scale of the thermal relay does not include the absorption of rating of the motor at 400V, the protection is guaranteed anyway.

NOTES

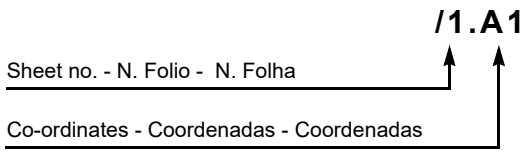
- The model RS 35/M BLU three phase leaves the factory with an electrical supply setting of **400V**. If **230V** power supply is used, change the motor connection from star to delta and change the setting of the thermal relay as well.
- The burners RS 25-35/M BLU have been approved for intermittent operation. This means they should be compulsorily stopped at least once every 24 hours to enable the control box to perform a check of its own efficiency at start-up. Normally, the stopping of the burner is guaranteed by the boiler's thermostat/pressure switch. If this is not the case, a time switch should be fitted in series to IN to provide for burner shut-down at least once every 24 hours.
- The RS 25-35/M BLU burners leave the factory fitted for two stage operation and must therefore be fitted to the TR thermostat/pressure switch. If on the other hand you require a burner with single stage operation, insert a jumper between clamps T6 - T7 of plug X4.

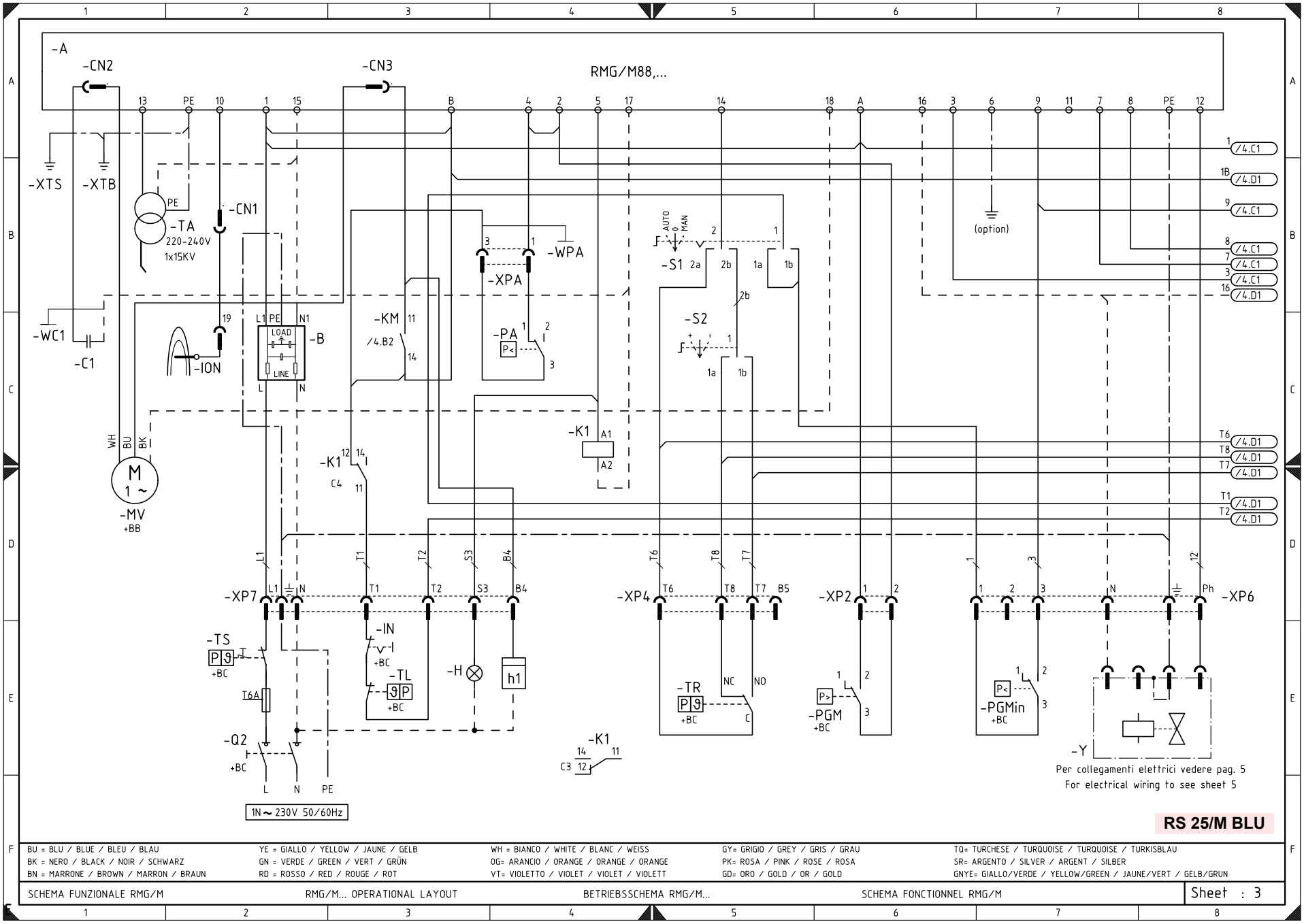
MODULATING OPERATION

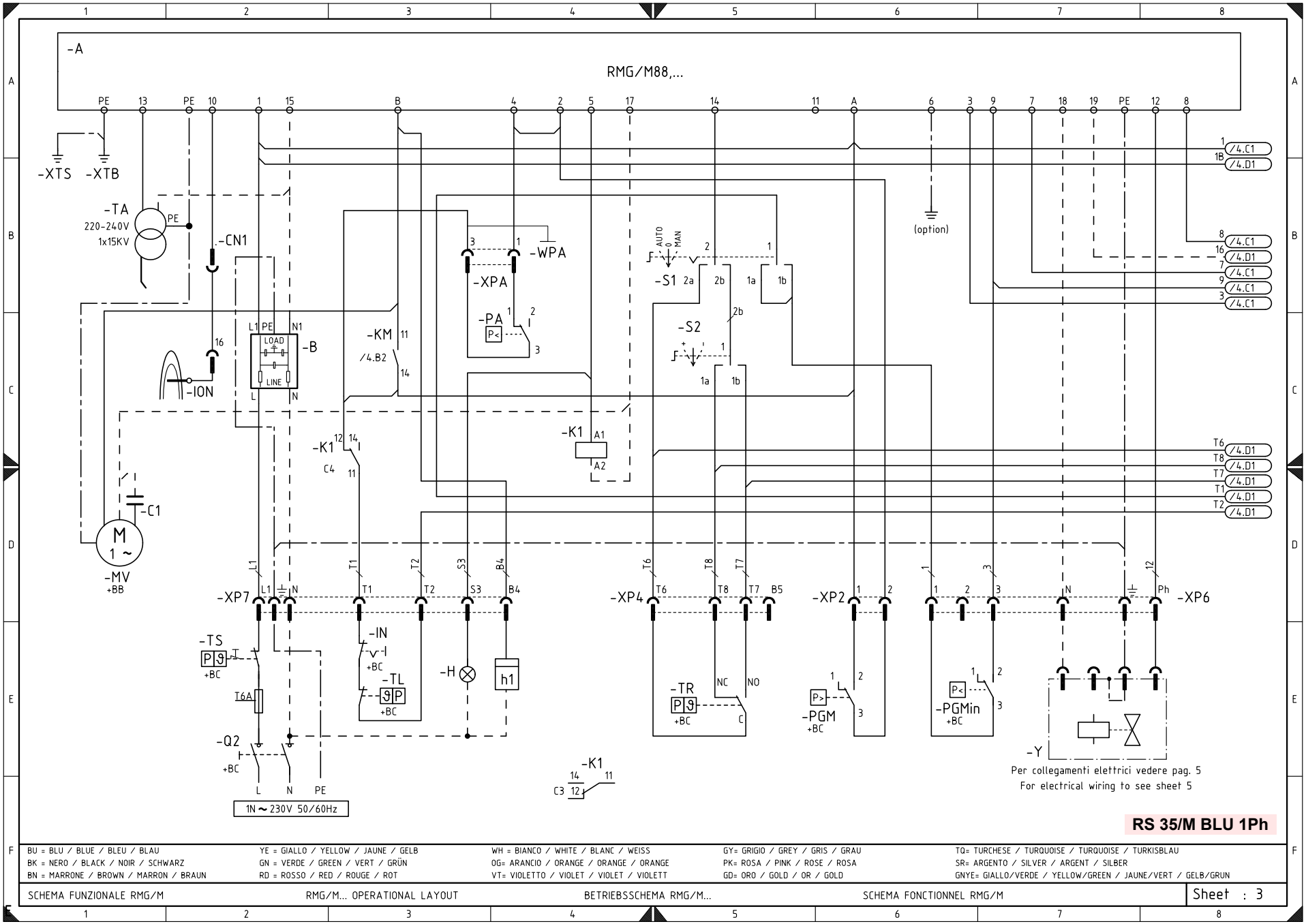
If the output power regulator kit RWF or the converter 0...10V / 4...20mA is connected, in 3-point signal, the thermostat/pressure switch TR must be removed (if the 4-pole socket becomes unhooked, apply the supplied cover).
Using just the regulator RWF also remove the TL thermostat/pressure switch.

ATTENTION:
- Do not invert the neutral with the phase in the electrical supply line. An inversion would lead to lockout due to ignition failure.
- Replace the components only with original spare parts.

2 Indication of references




-A
-CN2
-CN3
RMG/M88,...
-XTS
-XTB
-TA
220-240V
1x15KV
-CN1
-WC1
-C1
-ION
-B
LOAD
LINE
-KM
/4.B2
-XPA
-WPA
-PA
-S1
AUTO
MAN
-S2
(option)
-K1
-MV
+BB
-XP7
-XP4
-XP2
-XP6
-IN
-TL
-TS
-H
h1
-TR
NC
NO
-PGM
-PGMin
-Q2
T6A
-Y
1N~ 230V 50/60Hz
Per collegamenti elettrici vedere pag. 5
For electrical wiring to see sheet 5
RS 25/M BLU
BU = BLU / BLUE / BLEU / BLAU
BK = NERO / BLACK / NOIR / SCHWARZ
BN = MARRONE / BROWN / MARRON / BRAUN
YE = GIALLO / YELLOW / JAUNE / GELB
GN = VERDE / GREEN / VERT / GRÜN
RD = ROSSO / RED / ROUGE / ROT
WH = BIANCO / WHITE / BLANC / WEISS
OG= ARANCIO / ORANGE / ORANGE / ORANGE
VT= VIOLETTO / VIOLET / VIOLET / VIOLETT
GY= GRIGIO / GREY / GRIS / GRAU
PK= ROSA / PINK / ROSE / ROSA
GD= ORO / GOLD / OR / GOLD
TQ= TURCHESE / TURQUOISE / TURQUOISE / TURKISBLAU
SR= ARGENTO / SILVER / ARGENT / SILBER
GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN
SCHEMA FUNZIONALE RMG/M
RMG/M... OPERATIONAL LAYOUT
BETRIEBSSCHEMA RMG/M...
SCHEMA FONCTIONNEL RMG/M
Sheet : 3



BU = BLU / BLUE / BLEU / BLAU	YE = GIALLO / YELLOW / JAUNE / GELB	WH = BIANCO / WHITE / BLANC / WEISS	GY= GRIGIO / GREY / GRIS / GRAU	TQ= TURCHESE / TURQUOISE / TURQUOISE / TURKISBLAU
BK = NERO / BLACK / NOIR / SCHWARZ	GN = VERDE / GREEN / VERT / GRÜN	OG= ARANCIO / ORANGE / ORANGE / ORANGE	PK= ROSA / PINK / ROSE / ROSA	SR= ARGENTO / SILVER / ARGENT / SILBER
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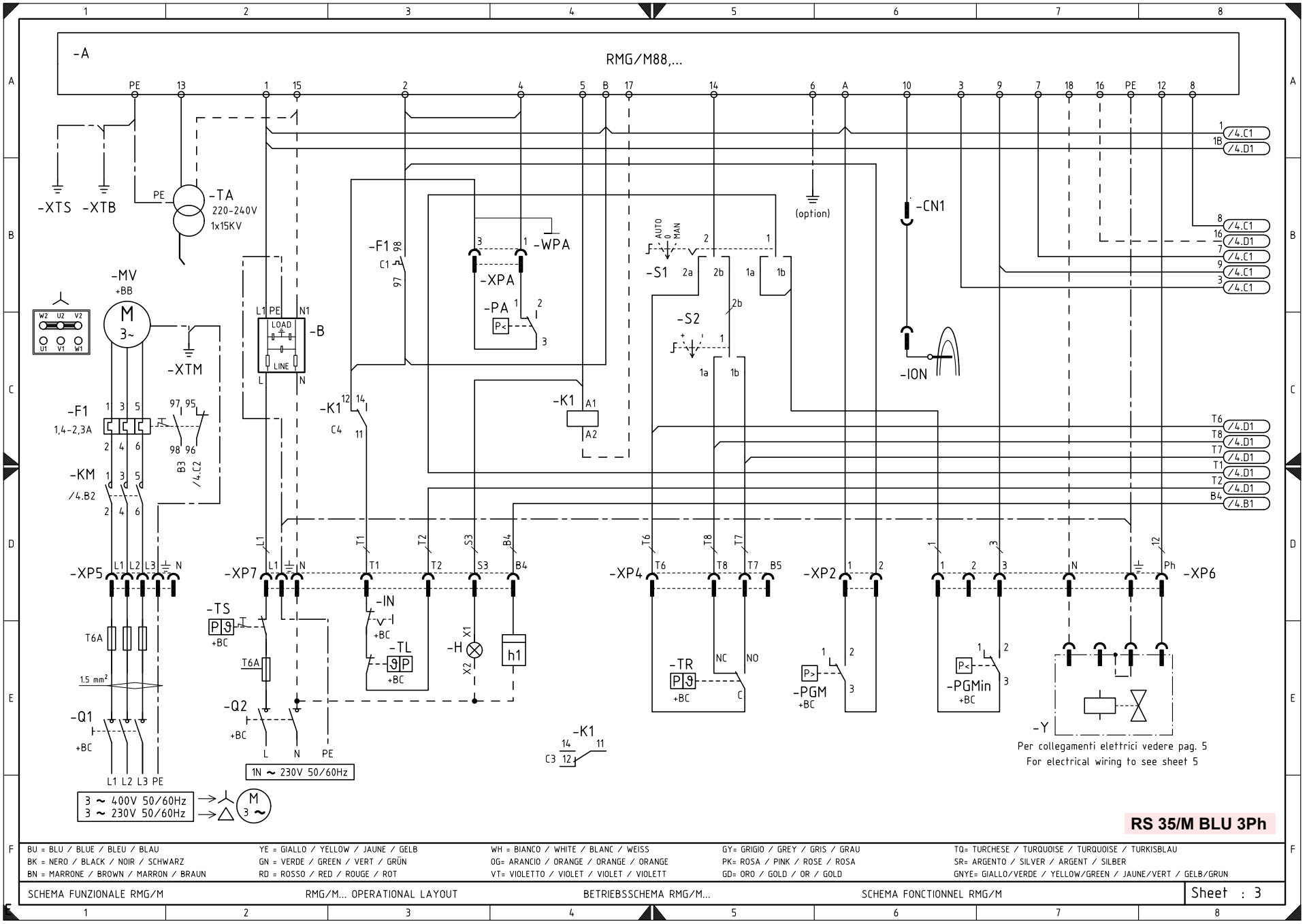
SCHEMA FUNZIONALE RMG/M	RMG/M... OPERATIONAL LAYOUT	BETRIEBSSCHEMA RMG/M...	SCHEMA FONCTIONNEL RMG/M	Sheet : 3


-A
RMG/M88,...
-XTS -XTB
-TA
220-240V
1x15KV
-MV
+BB
-XTM
-F1
1,4-2,3A
-KM
/4.B2
-XP5
-XP7
-XP4
-XP2
-XP6
-TS
-IN
-TL
-H
-Q1
-Q2
-F1
-WPA
-XPA
-PA
-S1
-S2
-B
-K1
-CN1
-ION
(option)
-TR
-PGMin
-PGM
-Y
T6A
1.5 mm²
1N ~ 230V 50/60Hz
3 ~ 400V 50/60Hz
3 ~ 230V 50/60Hz
Per collegamenti elettrici vedere pag. 5
For electrical wiring to see sheet 5
RS 35/M BLU 3Ph
BU = BLU / BLUE / BLEU / BLAU
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SCHEMA FUNZIONALE RMG/M
RMG/M... OPERATIONAL LAYOUT
BETRIEBSSCHEMA RMG/M...
SCHEMA FONCTIONNEL RMG/M
Sheet : 3

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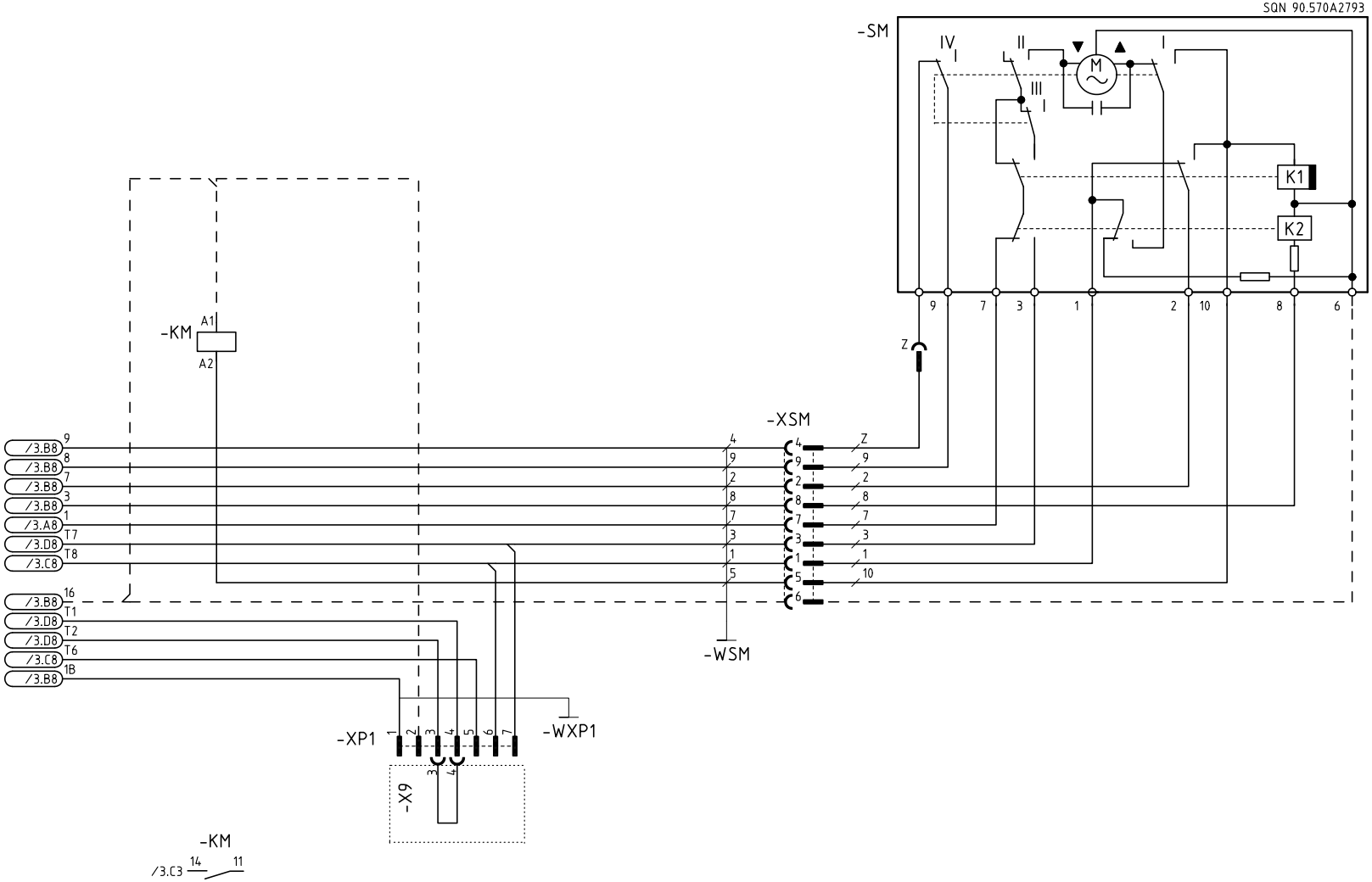
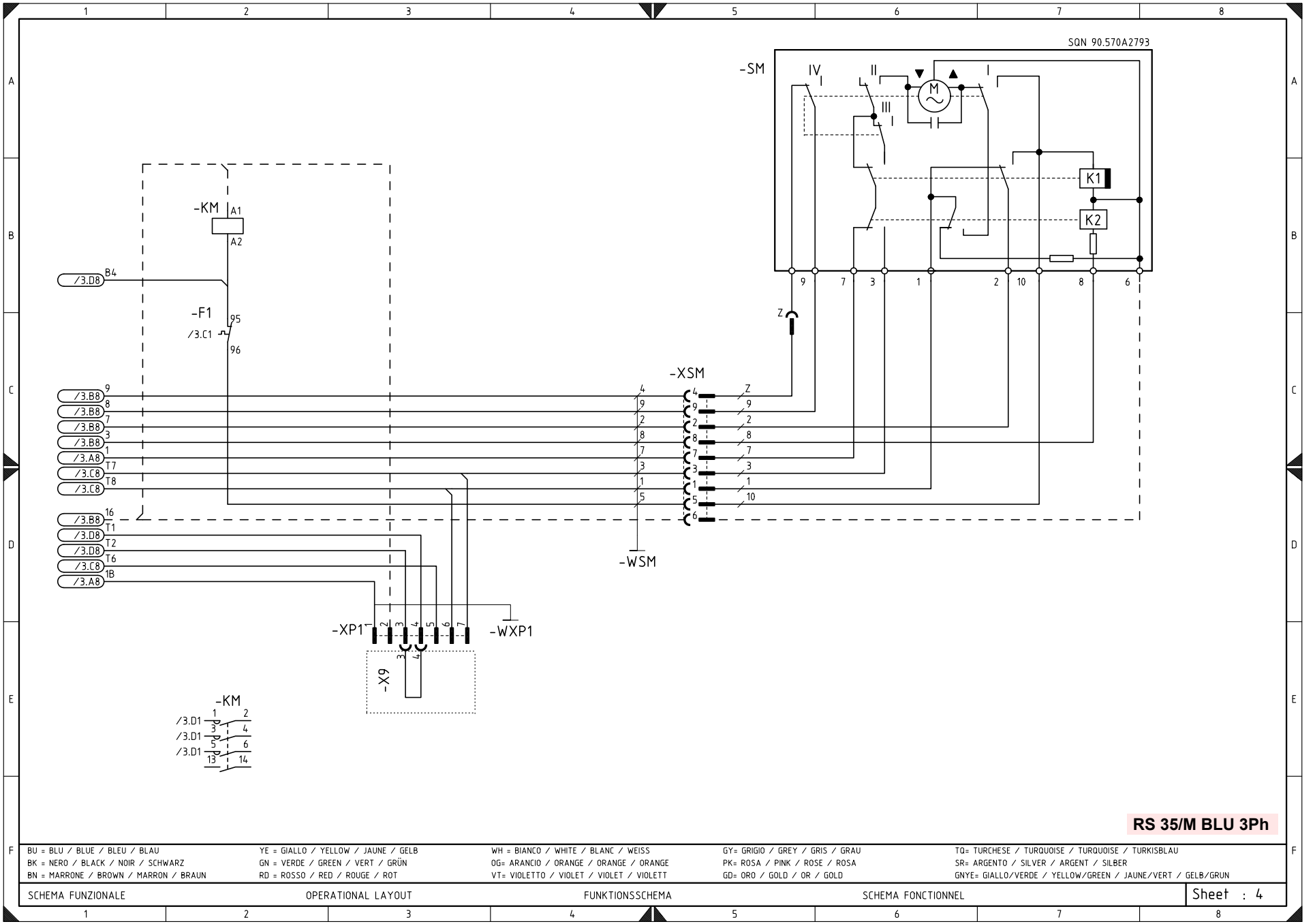


RS 25-35/M BLU 1Ph

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

SCHEMA FUNZIONALE	OPERATIONAL LAYOUT	FUNKTIONSSCHEMA	SCHEMA FONCTIONNEL	Sheet : 4

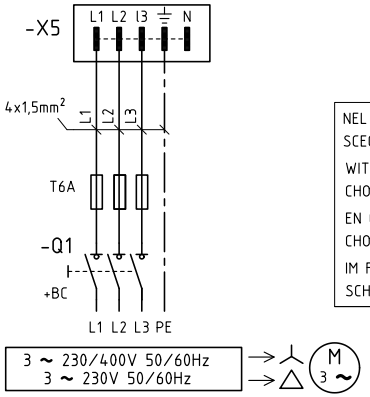


RS 35/M BLU 3Ph

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

SCHEMA FUNZIONALE | OPERATIONAL LAYOUT | FUNKTIONSSCHEMA | SCHEMA FONCTIONNEL | Sheet : 4

SOLO PER LA VERSIONE TRIFASE - ONLY FOR THE THREE PHASE VERSION



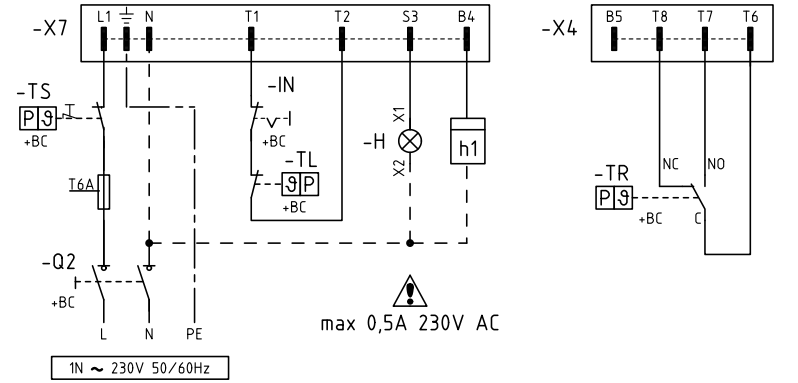
NEL CASO DI INTERRUTTORE MAGNETOTERMICO SCEGLIERE IL TIPO C

WITH A MAGNETO-THERMAL SWITCH CHOOSE TYPE C

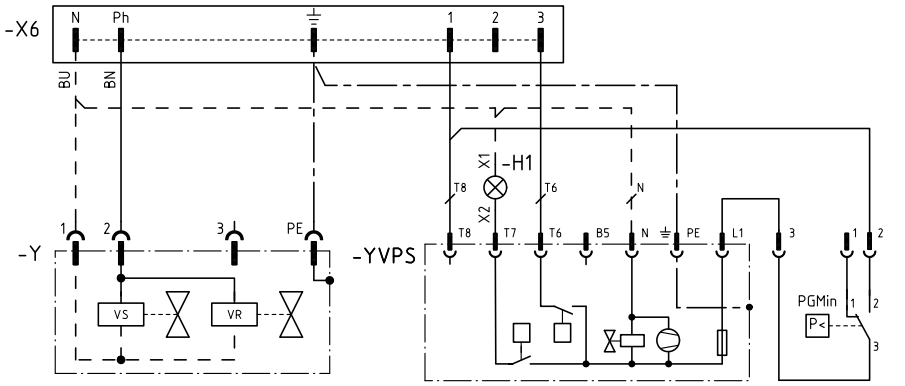
EN CAS D' INTERRUPTEUR MAGNÉTOTHERMIQUE CHOISIR LE TYPE C

IM FALLE EINES MAGNETOTHERMISCHEN SCHALTERS TYP C WÄHLEN

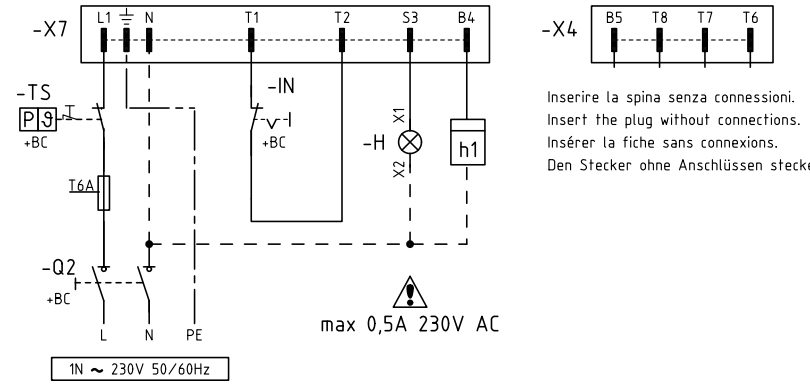
SENZA KIT RWF50 - WITHOUT RWF50 - SANS RWF50 - OHNE RWF50



CONTROLLO TENUTA VPS 504 - VPS 504 GAS LEAKAGE DETECTOR
VPS 504 CONTROLE D' ETANCHEITE GAZ - VPS 504 DICHTHEITSKONTROLLE



CON KIT RWF50 - WITH RWF50 - AVEC RWF50 - MIT RWF50



Inserire la spina senza connessioni.
Insert the plug without connections.
Insérer la fiche sans connexions.
Den Stecker ohne Anschlüssen stecken.

In questa configurazione la funzione del TL viene eseguita dal kit RWF50.
In this configuration, the TL function is performed by RWF50 kit.
Dans cette configuration, la fonction TL est effectuée par kit RWF50.
In dieser Konfiguration, wird die Funktion des TL durch kit RWF50 durchgeführt.

BU = BLU / BLUE / BLEU / BLAU	YE = GIALLO / YELLOW / JAUNE / GELB	WH = BIANCO / WHITE / BLANC / WEISS	GY= GRIGIO / GREY / GRIS / GRAU	TQ= TURCHESE / TURQUOISE / TURQUOISE / TURKISBLAU
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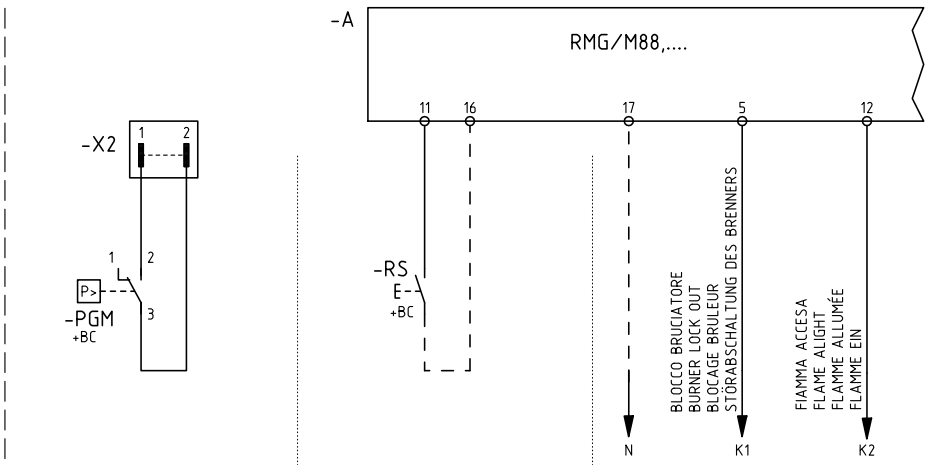
COLLEGAMENTI ELETTRICI A CURA DELL' INSTALLATORE ELECTRICAL CONNECTIONS SET BY INSTALLER ELEKTROANSCHLÜSSE VOM INSTALLATEUR AUSZUFÜHREN RACCORDEMENTS ÉLECTRIQUE EFFECTUÉ PAR L' INSTALLATEUR

Sheet : 5

KITS



PRESSOSTATO GAS DI MASSIMA
MAXIMUN GAS PRESSURE SWITCH
PRESSOSTAT GAZ MAXI
HÖCHSTGASDRUCKWÄCHTER

PULSANTE DI SBLOCCO A DISTANZA
REMOTE RESET BUTTON
BOUTON DE DEPLOCAGE A DISTANCE
FERNETSTORUNGSTASTE

USCITA PER KIT RELE' CONTATTI PULITI
OUTPUT FOR VOLTAGE FREE CONTACTS KIT
SORTIE POUR KIT RELAIS CONTACTS PROPRES
AUSGANG FÜR REINKONTAKTE-KIT

max 10A AC1 230V AC
max 2A AC15 230V AC

BU = BLU / BLUE / BLEU / BLAU	YE = GIALLO / YELLOW / JAUNE / GELB	WH = BIANCO / WHITE / BLANC / WEISS	GY= GRIGIO / GREY / GRIS / GRAU	TQ= TURCHESE / TURQUOISE / TURQUOISE / TURKISBLAU
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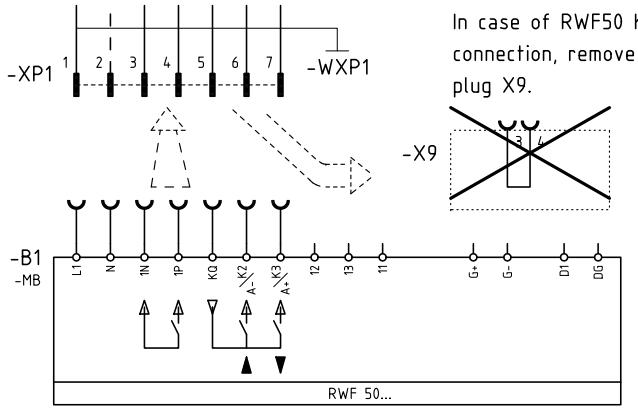
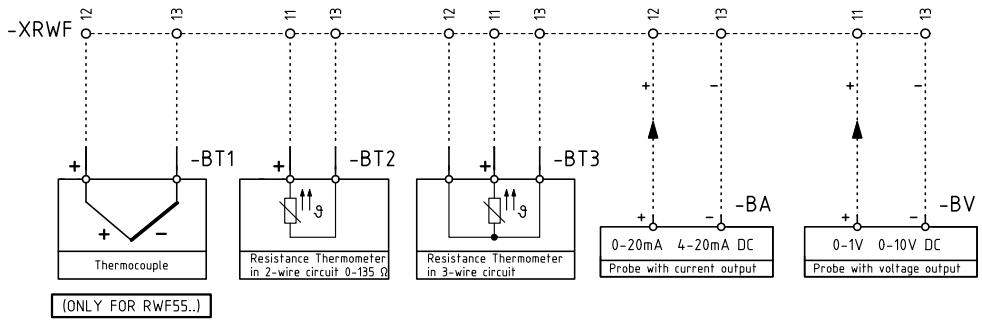
COLLEGAMENTI ELETTRICI A CURA DELL' INSTALLATORE ELECTRICAL CONNECTIONS SET BY INSTALLER ELEKTROANSCHLÜSSE VOM INSTALLATEUR AUSZUFÜHREN RACCORDEMENTS ÉLECTRIQUE EFFECTUÉ PAR L' INSTALLATEUR



In case of RWF50 KIT connection, remove the plug X9.

POSSIBILITY OF PROBE INPUT



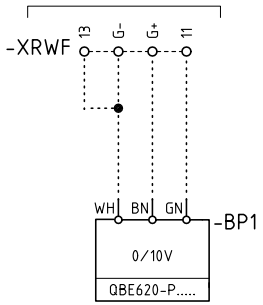
In caso di applicazione del Kit RWF50, nella spina X4 non collegare il termostato TR. Sostituire il termostato TL con un ponte ai morsetti T1 e T2 della X7. I morsetti T6, T7, T8 della X4 devono rimanere NON COLLEGATI. Per connettere il Kit RWF50 eliminare la spina X9.

If applying the internal kit RWF50, in plug X4 do not connect control thermostat switch TR. Replace the TL thermostat with a bridge to terminals T1 and T2 of the X7 plug. Terminals T6, T7, T8 of the X4 plug must stay UNCONNECTED.
To connect the kit RWF50 eliminate the X9 plug.

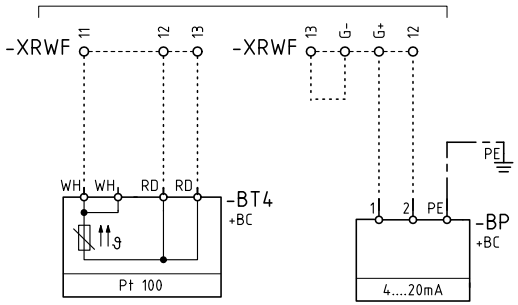
En cas d'application du Kit RWF50, dans la fiche X4 ne pas connecter le thermostat TR. Remplacer le thermostat TL avec un pont sur les bornes T1 et T2 de la fiche X7. Les bornes T6, T7, T8 de la fiche X4 doivent rester NON CONNECTÉS.
Pour connecter le kit RWF50 éliminer la fiche X9.

Bei Verwendung des Set RWF50 im Stecker X4 nicht das Thermostat TR anschließen.
Den Thermostat TL mit einer Brücke an den Klemmen T1 und T2 des X7 Steckers ersetzen.
Den klemmen T6, T7, T8 bei X4 dürfen NICHT ANGESCHLOSSEN werden.
Um das Kit RWF50 verbinden, den Stecker X9 beseitigen.

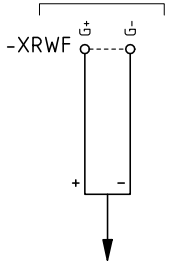
MODULATION INPUT WITH QBE620-P.....



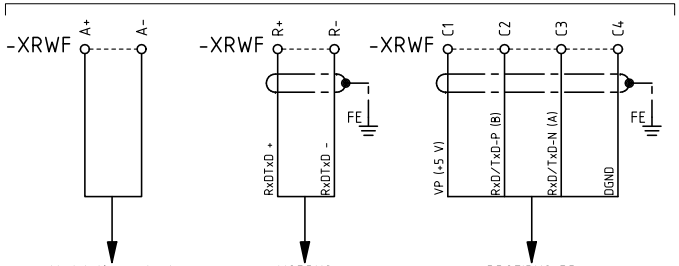
POSSIBILITY OF MODULATION INPUT WITH RIELLO PROBES



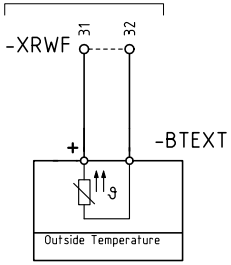
SERVICE



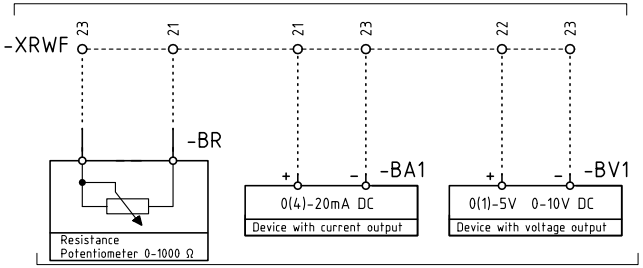
OPTIONAL



CLIMATIC COMPENSATION



POSSIBILITY OF SETPOINT INPUT AND SETPOINT SHIFT



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SCHEMA FUNZIONALE RWF50... | RWF50... OPERATIONAL LAYOUT | BETRIEBSSCHEMA RWF50... | SCHEMA FONCTIONNEL RWF50... | Sheet : 7

KEY TO ELECTRICAL LAYOUT

A – Electrical control box
B – Radio noise filter
B1 – Output power regulator RWF
BA – Input under current 4...20 mA DC
BA1 – Input under current 4...20 mA DC to modify the setpoint
+BB – Components on burners
+BC – Components on boiler
BP – Pressure probe
BP1 – Pressure probe
BR – Remote setpoint potentiometer
BT1 – Thermocouple probe
BT2 – Two–wire probe Pt100
BT3 – Three–wire probe Pt100
BT4 – Four–wire probe Pt100
BTEXT – External probe for climatic setpoint compensation
BV – Input under voltage 0...10 V DC
BV1 – Input under voltage 0...10 V DC to modify the remote setpoint
C1 – Capacitor
CN1 – Ionisation probe connector
CN2 – Connector
CN3 – Connector
F1 – Fan motor thermal relay
H – Remote lockout signalling
H1 – Lockout YVPS
IN – Manual burner stop switch
ION – Ionisation probe
h1 – Hour counter
K1 – Relay
KM – Motor contact maker
MV – Fan motor
PA – Air pressure switch
PGM – Maximum gas pressure switch
PGMin – Low gas pressure switch
Q1 – Three phase knife switch
Q2 – Single–phase knife switch
RS – Remote reset button
S1 – Unlit / automatic/ manual selector switch
S2 – Power increase/decrease selector switch
SM – Servomotor
TA – Ignition transformer
TL – Limit thermostat/pressure switch
TR – Adjustment thermostat/pressure switch
TS – Safety thermostat/pressure switch
Y – Gas regulation valve + gas safety valve
YVPS – Gas valve leak detection control device
XPA – Air pressure switch connector
XP1 – Modulation kit socket
XP2 – Maximum gas pressure switch connector
XP4 – 4-pole socket
XP5 – 5-pole socket
XP6 – 6-pole socket
XP7 – 7-pole socket
XRWF – Output power regulator RWF terminal strip
XSM – Servomotor connector
XTB – Shelf earth
XTM – Fan assembly earth
XTS – Servomotor assembly earth
X2 – 2-pin plug
X4 – 4-pin plug
X5 – 5-pin plug
X6 – 6-pin plug
X7 – 7-pin plug
X9 – 9-pin plug

LEYENDA ESQUEMAS ELÉCTRICOS

A – Caja de control eléctrica
B – Filtro antiinterferencias radio
B1 – Regulador de potencia RWF
BA – Entrada en corriente 4...20 mA DC
BA1 – Entrada en corriente 4...20 mA DC para modificar setpoint a distancia
+BB – Componentes a bordo de los quemadores
+BC – Componentes a bordo de la caldera
BP – Sonda de presión
BP1 – Sonda de presión
BR – Potenciómetro setpoint a distancia
BT1 – Sonda a termopar
BT2 – Sonda Pt100 de 2 hilos
BT3 – Sonda Pt100 de 3 hilos
BT4 – Sonda Pt100 de 4 hilos
BTEXT – Sonda externa para la compensación climática del setpoint
BV – Entrada en tensión 0...10 V DC
BV1 – Entrada en tensión 0...10 V DC para modificar setpoint a distancia
C1 – Condensador
CN1 – Conector para sonda de ionización
CN2 – Conector
CN3 – Conector
F1 – Relé térmico motor ventilador
H – Señalización de bloqueo a distancia
H1 – Bloqueo YVPS
IN – Interruptor parada manual del quemador
ION – Sonda de ionización
h1 – Cuentahoras
K1 – Relé
KM – Contador motor
MV – Motor ventilador
PA – Presostato aire
PGM – Presostato gas de máxima
PGMin – Presostato gas de mínima
Q1 – Interruptor seccionador trifásico
Q2 – Interruptor seccionador monofásico
RS – Botón de desbloqueo quemador a distancia
S1 – Selector apagado / automático / manual
S2 – Selector aumento / disminución de potencia
SM – Servomotor
TA – Transformador de encendido
TL – Termostato/presostato de límite
TR – Termostato/presostato de regulación
TS – Termostato/presostato de seguridad
Y – Válvula de regulación gas + válvula de seguridad gas
YVPS – Dispositivo de control de estanqueidad válvula gas
XPA – Conector presostato aire
XP1 – Conector hembra para kit modulación
XP2 – Conector presostato gas de máxima
XP4 – Conector hembra de 4 contactos
XP5 – Conector hembra de 5 contactos
XP6 – Conector hembra de 6 contactos
XP7 – Conector hembra de 7 contactos
XRWF – Conector regulador de potencia RWF
XSM – Conector servomotor
XTB – Tierra ménsula
XTM – Tierra grupo ventilador
XTS – Tierra grupo servomotor
X2 – Conector macho de 2 contactos
X4 – Conector macho de 4 contactos
X5 – Conector macho de 5 contactos
X6 – Conector macho de 6 contactos
X7 – Conector macho de 7 contactos
X9 – Conector macho de 9 contactos

LEGENDA ESQUEMAS ELÉCTRICOS

A	–	Caixa de controlo eléctrica
B	–	Filtro contra radio-interferências
B1	–	Regulador de potência RWF
BA	–	Entrada em corrente 4...20 mA DC
BA1	–	Entrada em corrente 4...20 mA DC para modificação do ponto de referência remoto
+BB	–	Componentes bordo queimadores
+BC	–	Componentes bordo caldeira
BP	–	Sonda de pressão
BP1	–	Sonda de pressão
BR	–	Potenciómetro ponto de referência remoto
BT1	–	Sonda por termopar
BT2	–	Sonda Pt100 de 2 fios
BT3	–	Sonda Pt100 de 3 fios
BT4	–	Sonda Pt100 de 4 fios
BTEXT	–	Sonda externa para a compensação climática do ponto de referência
BV	–	Entrada em tensão 0...10 V DC
BV1	–	Entrada em tensão 0...10 V DC para modificação do ponto de referência remoto
C1	–	Condensador
CN1	–	Conector sonda de ionização
CN2	–	Conector
CN3	–	Conector
F1	–	Relé térmico motor ventilador
H	–	Sinalização de bloqueio remoto
H1	–	Bloqueio YVPS
IN	–	Interruptor paragem manual queimador
ION	–	Sonda de ionização
h1	–	Conta-horas
K1	–	Relé
KM	–	Contactor motor
MV	–	Motor ventilador
PA	–	Pressostato de ar
PGM	–	Pressostato gás de máxima
PGMin	–	Pressostato de gás de mínima
Q1	–	Interruptor seccionador trifásico
Q2	–	Interruptor seccionador monofásico
RS	–	Botão de desbloqueio queimador a distância
S1	–	Selector desligado / automático / manual
S2	–	Selector aumento / diminuição potência
SM	–	Servomotor
TA	–	Transformador de acendimento
TL	–	Termóstato/pressostato de limite
TR	–	Termóstato/pressostato de regulação
TS	–	Termóstato/pressostato de segurança
Y	–	Válvula de regulação gás + válvula de segurança gás
YVPS	–	Dispositivo de controlo da estanquidade das válvulas gás
XPA	–	Conector pressostato de ar
XP1	–	Tomada para kit modulação
XP2	–	Conector pressostato gás de máxima
XP4	–	Tomada de 4 pólos
XP5	–	Tomada de 5 pólos
XP6	–	Tomada de 6 pólos
XP7	–	Tomada de 7 pólos
XRWF	–	Conector regulador de potência RWF
XSM	–	Conector servomotor
XTB	–	Terra consola
XTM	–	Terra grupo ventilador
XTS	–	Terra grupo servomotor
X2	–	Ficha de 2 pólos
X4	–	Ficha de 4 pólos
X5	–	Ficha de 5 pólos
X6	–	Ficha de 6 pólos
X7	–	Ficha de 7 pólos
X9	–	Ficha de 9 pólos