GB

Forced draught gas burners

Modulanting operation

CE

CODE	MODEL	TYPE
20166002	RS 310/E O_2 BLU	1138T1
20174926	RS 410/E O_2 BLU	1135T1
20179072	RS 410/E O_2 BLU	1135T1
20158157	RS 410/E O_2 BLU	1135T1
20174930	RS 510/E O_2 BLU	1136T1
20156791	RS 510/E O_2 BLU	1136T1
20174931	RS 610/E O_2 BLU	1137T1

20173117 (2) - 03/2020

Translation of the original instructions

1 Declarations

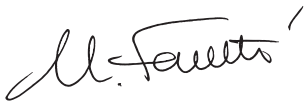
Declaration of conformity in accordance with ISO / IEC 17050-1		
Manufacturer:	RIELLO S.p.A.	
Address:	Via Pilade Riello, 7 37045 Legnago (VR)	
Product:	Forced draught gas burners	
Model and type:	RS 310/E O_2 BLU RS 410/E O_2 BLU RS 510/E O_2 BLU RS 610/E O_2 BLU	1138T1 1135T1 1136T1 1137T1
These products are in compliance with the following Technical Standards:		
EN 676		
EN 12100		
and according to the European Directives:		
GAR	2016/426/EU	Gas Devices Regulation
MD	2006/42/CE	Machine Directive
LVD	2014/35/EU	Low Voltage Directive
EMC	2014/30/EU	Electromagnetic Compatibility
Such products are marked as follows:		
CE 0085	**CE-0085CP0166** (Classe 3 EN 676)	

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 revision 26.01.2010**".			
Product	Model	Type	Output
Forced draught gas burners	RS 310/E O_2 BLU	1138T1	400 - 3630 kW
	RS 410/E O_2 BLU	1135T1	500 - 4450 kW
	RS 510/E O_2 BLU	1136T1	680 - 5250 kW
	RS 610/E O_2 BLU	1137T1	1000 - 6250 kW

Legnago, 01.12.2015

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



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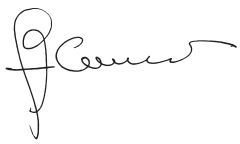


2 Information and general warnings

2.1 Information about the instruction manual

2.1.1 Introduction

The instruction manual supplied with the burner:

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

Symbols used in the manual

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

2.1.2 General dangers

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

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

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

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

2.1.3 Other symbols

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

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

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

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

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

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

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

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

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

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

➤ This symbol indicates a list.

Abbreviations used

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

2.1.4 Delivery of the system and the instruction manual

When the system is delivered, it is important that:

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

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

.....

– the address and telephone number of the nearest Assistance Centre

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

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

2.2 Guarantee and responsibility

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

WARNING

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

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

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

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

3 Safety and prevention

3.1 Introduction

The burners have been designed and built in compliance with current regulations and directives, applying the known technical rules of safety and envisaging all the potential danger situations. It is necessary, however, to bear in mind that the imprudent and clumsy use of the equipment may lead to situations of death risk for the user or third parties, as well as the damaging of the burner or other items. Inattention, thoughtlessness and excessive confidence often cause accidents; the same applies to tiredness and sleepiness.
It is a good idea to remember the following:

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

In particular:
it can be applied to boilers operating with water, steam, diathermic oil, and to other uses expressly foreseen by the manufacturer;
the type and pressure of the fuel, the voltage and frequency of the electrical power supply, the minimum and maximum deliveries for which the burner has been regulated, the pressurisation of the combustion chamber, the dimensions of the combustion chamber and the room temperature must all be within the values indicated in the instruction manual.

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


WARNING

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:

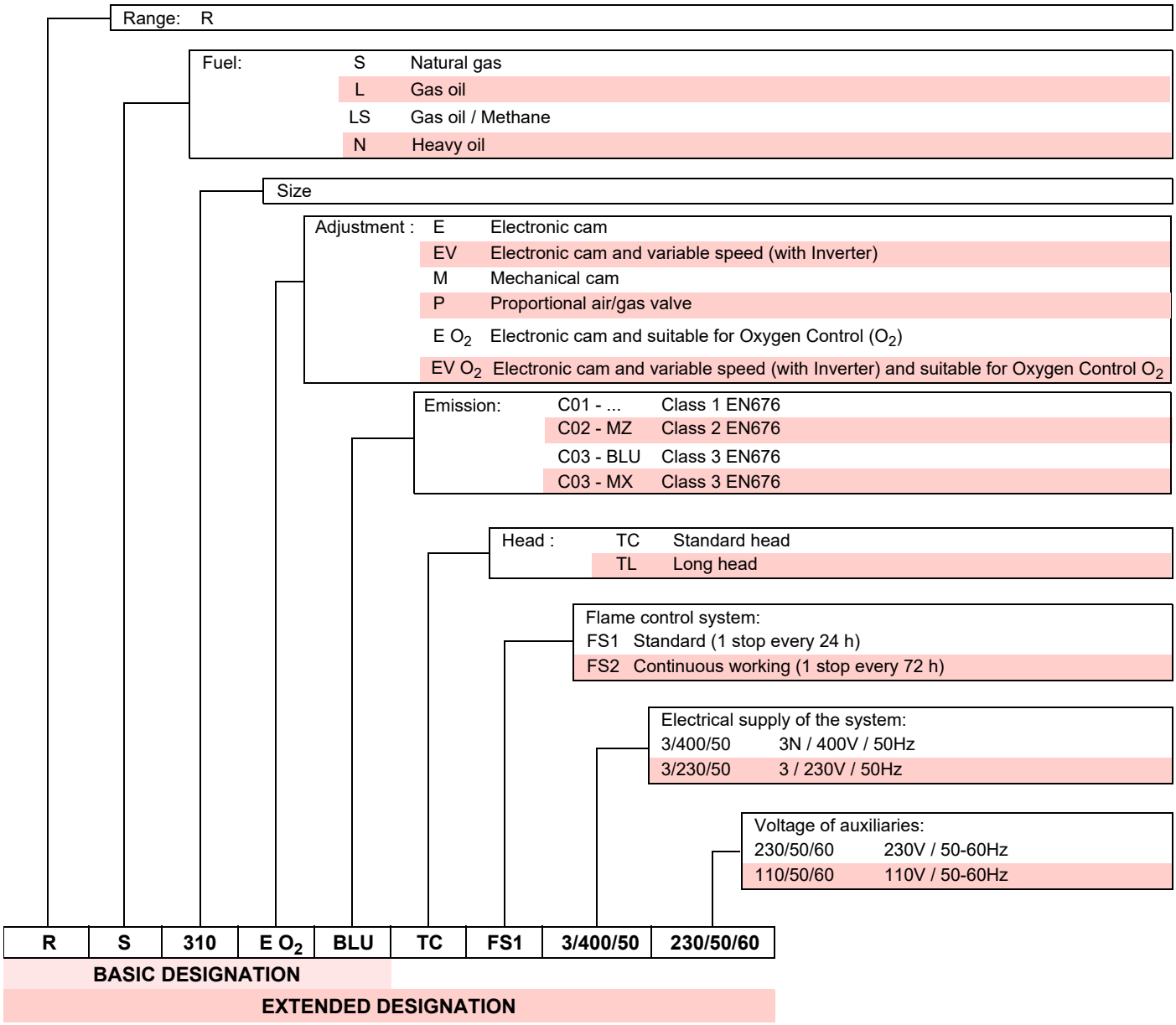
- ➤ undertakes to entrust the machine exclusively to suitably trained and qualified personnel;
- ➤ undertakes to inform his personnel in a suitable way about the application and observance of the safety instructions. With that aim, he undertakes to ensure that everyone knows the use and safety instructions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

In addition:

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

4 Technical description of the burner

4.1 Burner designation



4.2 Models available

Designation	Voltage	Start-up	Code
RS 310/E O_2 BLU TC	3/400/50	Direct	20166002
RS 410/E O_2 BLU TC	3/400/50	Direct	20174926
RS 410/E O_2 BLU TC	3/400/50	Star/Triangle	20179072
RS 410/E O_2 BLU TL	3/400/50	Star/Triangle	20158157
RS 510/E O_2 BLU TC	3/400/50	Star/Triangle	20174930
RS 510/E O_2 BLU TL	3/400/50	Star/Triangle	20156791
RS 610/E O_2 BLU TC	3/400/50	Star/Triangle	20174931

Tab. A

4.3 Burner categories - Countries of destination

Gas category	Destination country
I_{2H}	AT-BG-CH-CZ-DK-EE-ES-FI-GB-GR-HU-HR-IE-IS-IT-LT-LV-NO-PT-RO-SE-SI-SK-TR
I_{2ELL}	DE
I_{2EK}	NL
I_{2Er}	FR
$I_{2E(R)}$	BE
I_{2E}	LU - PL

Tab. B

4.4 Technical data

Model			RS 310/E O_2 BLU	RS 410/E O_2 BLU
Power (1) Delivery (1)	min - max	kW	400/1200 ÷ 3630	500/1500 ÷ 4450
Fuels			Natural gas: G20 (methane gas) - G21 - G22 - G23 - G25	
Gas pressure at max. output (2) Gas: G20/G25		mbar	50.1/74.7	53.1/79.2
Operation			FS1: Intermittent (min. 1 stop in 24 hours) FS2: Continuous (min. 1 stop in 72 hours)	
Standard applications			Boilers: water, steam, diathermic oil	
Ambient temperature		°C	0 - 50	
Combustion air temperature		°C max	60	
Burner weight (complete with its packaging)		kg	250	250
Noise levels (3)	Sound pressure Sound power	dB(A)	78 89	80 91

Tab. C

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

4.5 Electrical data

DIRECT START UP

Model		RS 310/E O_2 BLU	RS 410/E O_2 BLU
Main electrical supply		3N ~ 400V +/-10% 50 Hz	
Fan motor IE2	rpm V kW A	2900 220-240 / 380-415 7,5 23.2/13.4	2930 230/400 9,2 28.6/16.5
Ignition transformer	V1 - V2 I1 - I2	230 V - 1 x 8 kV 1 A - 20 mA	
Absorbed electrical power	kW max	9.1	10.8
Protection level		IP 54	

Tab. D

STAR - TRIANGLE START UP

Model		**RS 410/E O_2 BLU**	**RS 510/E O_2 BLU**	**RS 610/E O_2 BLU**
Main electrical supply		3N ~ 400V +/-10% 50 Hz		
Fan motor IE2	rpm V kW A	2930 400/690 9,2 16,5/9,6	2880 400/690 12 21,3/12,3	2915 400/690 15 26,8/15,5
Ignition transformer	V1 - V2 I1 - I2	230 V - 1 x 8 kV 1 A - 20 mA		
Absorbed electrical power	kW max	10,8	13,7	17
Protection level		IP 54		

Tab. E

WARNING

The burner leaves the factory set to operate FS1. When required operation FS2, see specific manual LMV5...

4.6 Maximum dimensions

The maximum dimensions of the burner are given in Fig. 1.
Bear in mind that inspection of the combustion head requires the burner to be opened and the rear part turned on the hinge.
The maximum dimensions of the open burner are indicated by the L and R positions.
The I position is reference for the refractory thickness of the boiler door.

WARNING

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

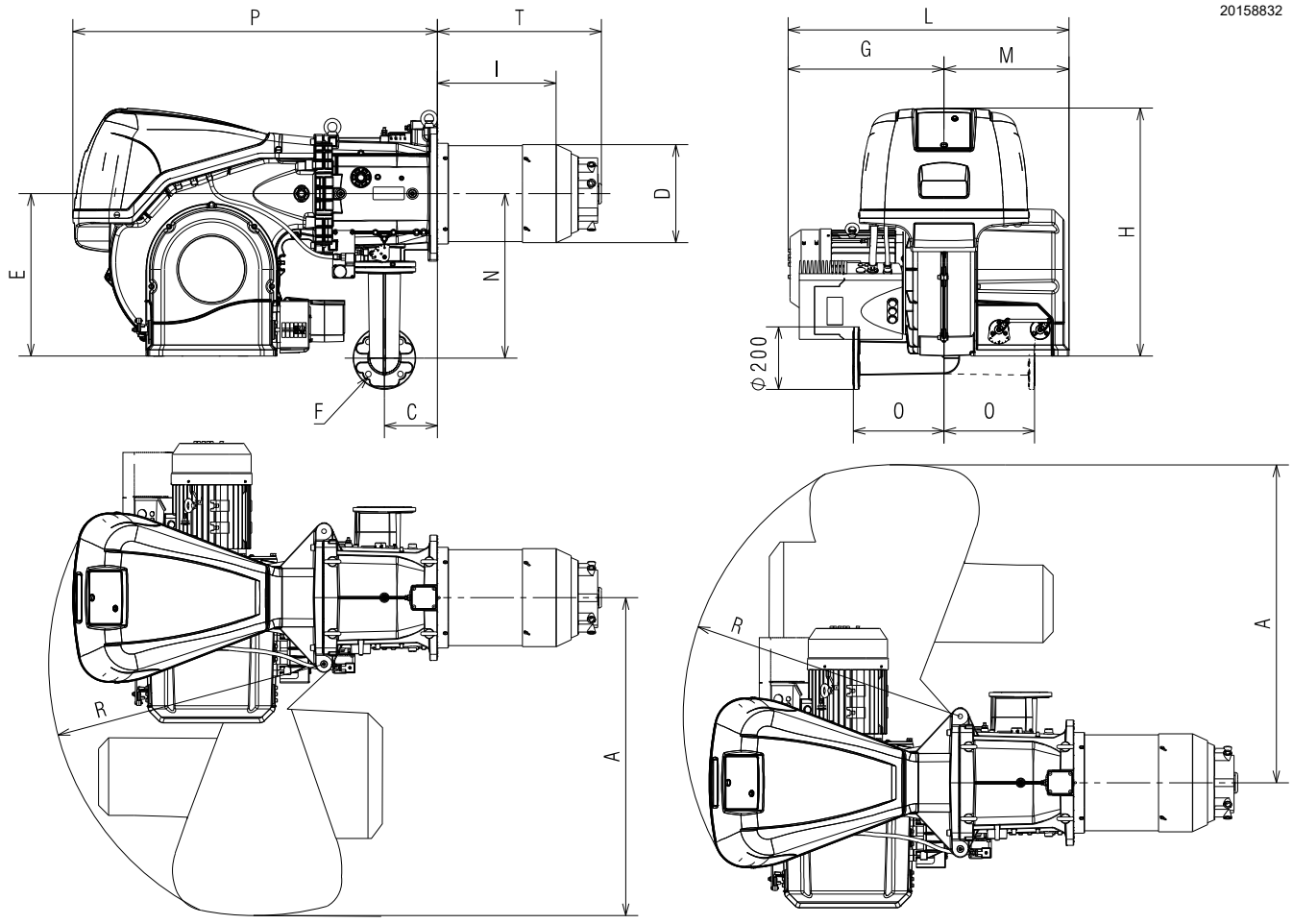


Fig. 1

mm	A	C	D	E	F*	G	H	I	L	M	N	O	P	R	T
RS 310/E O_2 BLU	1135	178	306	520	DN65	575	790	345	1075	400	528	290	1270	970	465
RS 410/E O_2 BLU	1135	178	313	520	DN65	525	790	375	925	400	528	290	1270	970	520
RS 410/E O_2 BLU	1135	178	313	520	DN65	525	790	475	925	400	528	290	1270	970	617
RS 510/E O_2 BLU	1135	178	313	520	DN65	525	790	375	925	400	528	290	1270	970	510
RS 510/E O_2 BLU	1135	178	313	520	DN65	530	790	556	930	400	528	290	1270	970	700
RS 610/E O_2 BLU	1135	178	313	520	DN65	530	790	360	930	400	528	290	1270	970	520

Tab. F

4.7 Firing rates

The **MAXIMUM OUTPUT** is chosen from within the diagram area (Fig. 2).
The **MINIMUM OUTPUT** must not be lower than the minimum limit of the diagram:

Model	kW
RS 310/E O_2 BLU	400
RS 410/E O_2 BLU	500
RS 510/E O_2 BLU	680
RS 610/E O_2 BLU	1000

Tab. G

WARNING

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 pag. 26.

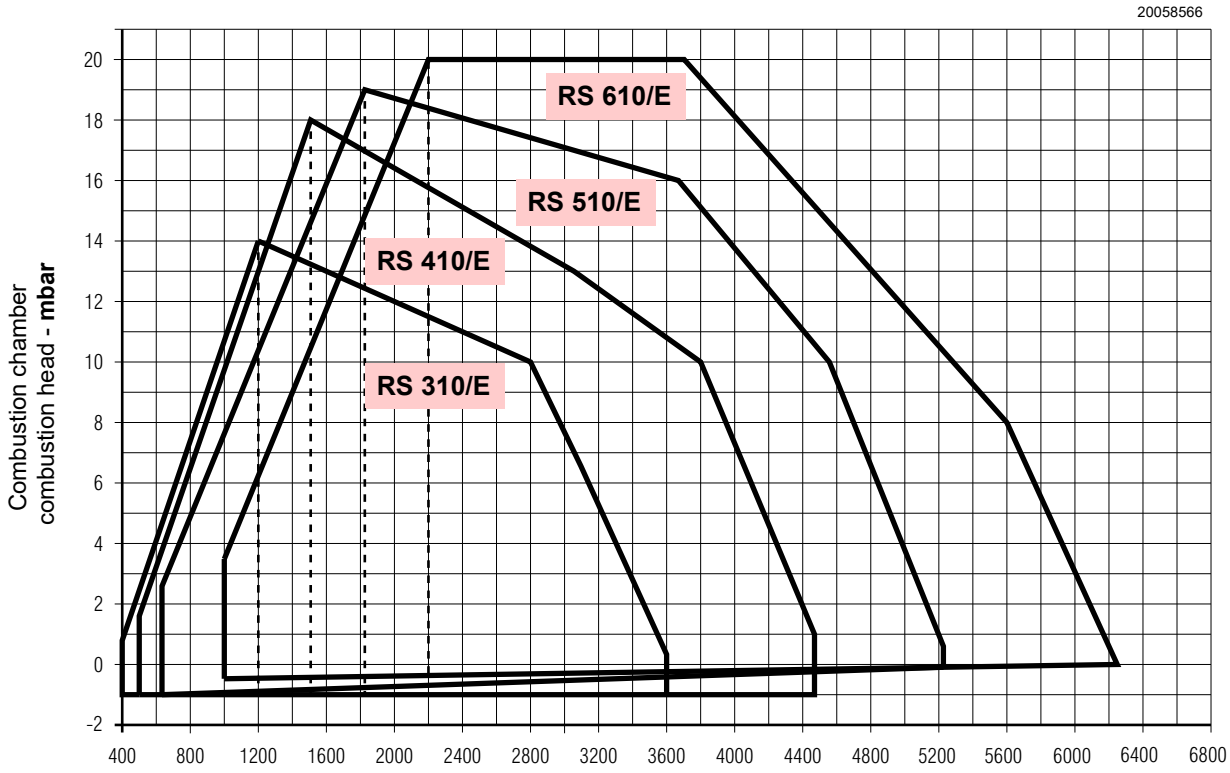


Fig. 2

4.8 Test boiler

The burner/boiler combination does not pose any problems if the boiler is EC approved and its combustion chamber dimensions are similar to those indicated in the diagram (Fig. 3).
If the burner must be combined with a boiler that has not been EC approved and/or its combustion chamber dimensions are clearly smaller than those indicated in the diagram, consult the manufacturer.

The firing rates were set in relation to special test boilers, according to EN 676 regulations.
In Fig. 3 you can see the diameter and length of the test combustion chamber.
Example:
Output 5000 kW - diameter 100 cm - length 5 m

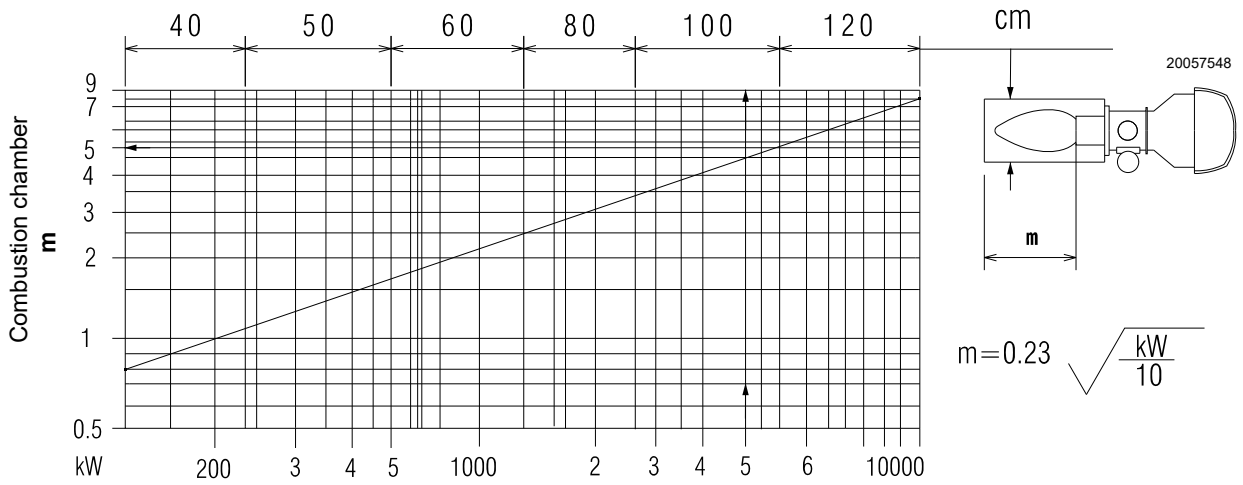


Fig. 3

4.9 Burner equipment

Gasket for gas train adaptor. . . . . No. 1
Adaptor for gas train. . . . . No. 1
Screws for fixing the gas train adaptor: M 16 x 70 . . . . . No. 4
Thermal insulation screen . . . . . No. 1
M 18 x 60 screws to secure the burner flange to the boiler No. 4
Cable grommets kit for optional electrical wiring input. . . . No. 1
M16 nuts to fix the gas elbow to the pipe coupling . . . . . No. 8
Stud bolts M16X60 to fix the gas elbow to the pipe coupling . . . . . No. 1
Documentation. . . . . No. 1
Spare parts list . . . . . No. 1

4.10 Burner description

ASSEMBLY VIEW

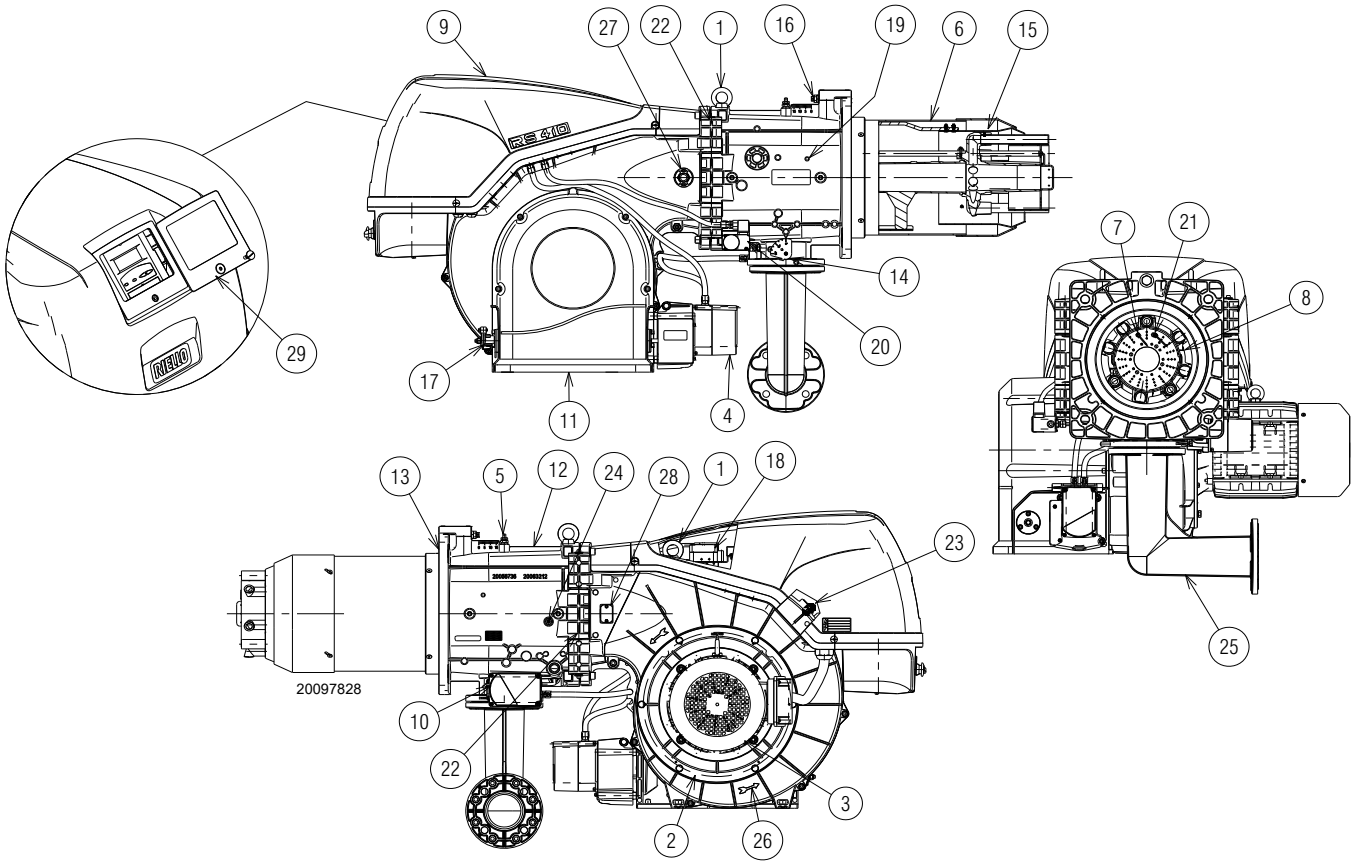


Fig. 4

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

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

WARNING

To open the burner see section “Access to head internal part” on pag. 24.

4.11 Electrical panel description

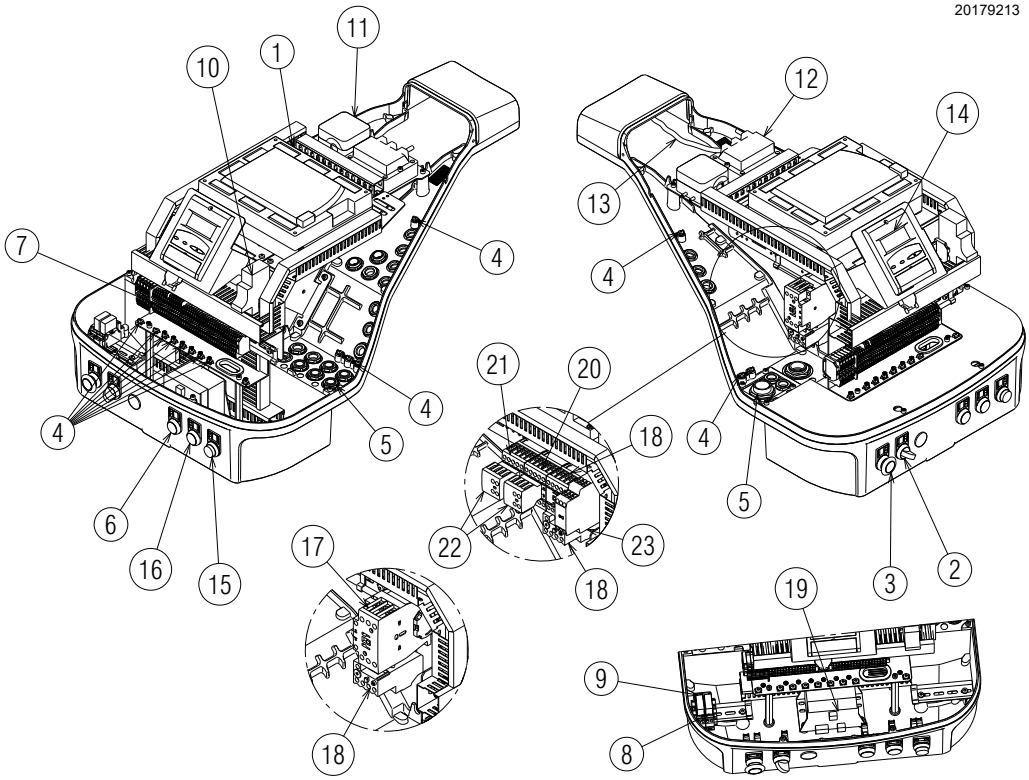


Fig. 5

1 Electrical control box
2 0/AUTO selector
3 Safety button
4 Earth terminal
5 Supply cables and external connections passage. See section “Electrical wiring” on pag. 31
6 Signal “POWER ON”
7 Main terminal supply board
8 Relay with clean contacts for signalling the burner is in lock-out
9 Relay with clean contacts for signalling the burner is operating
10 Auxiliary circuits fuse (includes a spare fuse)
11 Air pressure switch
12 Ignition transformer
13 Ionisation probe cable
14 Operator panel with LCD display
15 Light signalling burner lockout and reset button
16 Signal “OVERLOAD FAN MOTOR”
17 Direct start up line contactor
18 Thermal relay (with RESET button)
19 Electrical control box power supply
20 Triangle contactor (Star/triangle start up)
21 Star contactor (Star/triangle start up)
22 Auxiliary contacts
23 Timer for star/triangle start up

4.12 Control box for the air/fuel ratio (LMV52...)

Warnings

WARNING

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

The LMV52 control box... is a safety device! Avoid opening or modifying it, or forcing its operation. Riello S.p.A. cannot assume any responsibility for damage resulting from unauthorised interventions!

Risk of explosion!

An incorrect configuration can provoke fuel overcharging, with the consequential risk of explosion! Operators must be aware that incorrect settings made on the AZL5… display and operating unit and incorrect settings of the fuel and / or air actuator positions can lead to dangerous burner operating conditions.

- ➤ All interventions (assembly and installation operations, assistance, etc.) must be carried out by qualified personnel.
- ➤ Before modifying the wiring in the LMV52 control box connection area, fully disconnect the system from the power supply (omnipolar separation). Check the system is not powered and cannot be accidentally reconnected. Failure to do this will lead to the risk of electrocution.
- ➤ Protection against electrocution from the LMV5... control box and all connected electric components is obtained with correct assembly.
- ➤ Before any intervention (assembly and installation operations, assistance, etc.), ensure the wiring is in order and that the parameters are correctly set, then make the safety checks.
- ➤ Falls and collisions can negatively affect the safety functions.
  In this case, the control box must not be operated, even if it displays no evident damage.
- ➤ In programming mode, the position check of actuators and VSD (checking electronic fuel / air ratio control) is different from the check during automatic operation.
  As for automatic operation, the actuators are guided together to the positions requested and, if an actuator does not reach the position requested, adjustments are made until the position is actually reached. However, in contrast to automatic operation, there are no time limits to these corrective actions.
  The other actuators maintain their positions until all actuators have reached the positions currently required.
  This is absolutely important to set the fuel / air ratio control system.
  During the time the fuel / air ratio curves are being programmed, the person making the plant settings must continuously monitor the quality of the combustion process (e.g. by means of a flue gas analyser).
  Also, if combustion levels are poor, or in the event of dangerous situations, the commissioning engineer must take appropriate action (e.g. switching off manually).

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

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

D9301

Fig. 6

Mechanical structure

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

- Burner adjustment device with system for checking the seal of the gas valves
- Electronic fuel/air ratio monitoring device with a maximum of 6 (LMV52…) actuators
- Optional PID temperature / pressure controller (load controller)
- Optional VSD module Mechanical design

Installation notes

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

Electrical connection of flame detector

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

- always separate the detector cables from the other cables:
  – Line capacitance reduces the magnitude of the flame signal.
  – Use a separate cable.
- Respect the allowed cable lengths.

Technical data

LMV52... base control box	Mains voltage	AC 230V -15% / +10%
	Mains frequency	50 / 60 Hz ±6 %
	Power absorption	< 30W (normal)
	Safety class	I, with components in compliance with II and III, according to DIN EN 60730-1
Load on 'input' terminals	F1 unit fuse (internal)	6.3 AT
	Main fuse of perm. network (external)	Max. 16 AT
	Undervoltage • Safety switch-off from operating position to mains voltage • Restart when mains voltage picks up	 < AC 186 V > AC 188 V
	Oil pump / magnetic clutch (nominal voltage) • Nominal current • Power factor	 2A cosφ > 0.4
	Air pressure switch test valve (nominal voltage) • Nominal current • Power factor	 0.5A cosφ > 0.4
Load on 'output' terminals	**Total load on the contacts:** • Mains voltage • Total unit input current (safety circuit) load on contacts due to: - Fan motor contactor - Ignition transformer - Valve - Oil pump / magnetic clutch	 AC 230 V -15 % / +10 % Max. 5 A
	Single contact loading: Fan motor contactor (nominal voltage) • Nominal current • Power factor	 1A cosφ > 0.4
	Alarm output (nominal voltage) • Nominal current • Power factor	 1A cosφ > 0.4
	Ignition transformer (nominal voltage) • Nominal current • Power factor	 2A cosφ > 0.2
	Fuel gas valve (nominal voltage) • Nominal current • Power factor	 2A cosφ > 0.4
	Fuel oil valve (nominal voltage) • Nominal current • Power factor	 1A cosφ > 0.4
Cable lengths	Main line	Max. 100 m (100 pF/m)
Environmental conditions	Operation Climatic conditions Mechanical conditions Temperature range Humidity	DIN EN 60721-3-3 Class 3K3 Class 3M3 -20...+60°C < 95% RH

Tab. H

4.13 Actuator

Warning notes

WARNING

To avoid injury to persons, damage to property or the environment, the following warning notes should be observed!

Do not open, interfere with or modify the actuators!

- ➤ All activities (mounting, installation and service work, etc.) must be performed by qualified staff.
- ➤ Before making any wiring changes in the connection area of the actuator, completely isolate the burner control from the mains supply (all-polar disconnection).
- ➤ Ensure protection against electric shock hazard by providing adequate protection for the connection terminals and by securing the housing cover.
- ➤ Check to ensure that wiring is in an orderly state.
- ➤ Fall or shock can adversely affect the safety functions. Such units must not be put into operation, even if they do not exhibit any damage.

WARNING

The housing cover may only be removed for short periods of time for wiring or when making the addressing.
It must be made certain that dust or dirt will not get inside the actuator while such work is carried out.

Use

The actuator (Fig. 7) is used to drive and position the air damper and the gas butterfly valve, without mechanical leverages but via the interposition of an elastic coupling.

When used in connection with burner controls or electronic fuel / air ratio control, the associated controlling elements are controlled depending on burner output.

Installation notes

- Always run the high-voltage ignition cables separate from the unit and other cables while observing the greatest possible distance.
- The holding torque is reduced when the actuator's power supply is switched off.

WARNING

When servicing or replacing the actuator, take care not to invert the connectors.

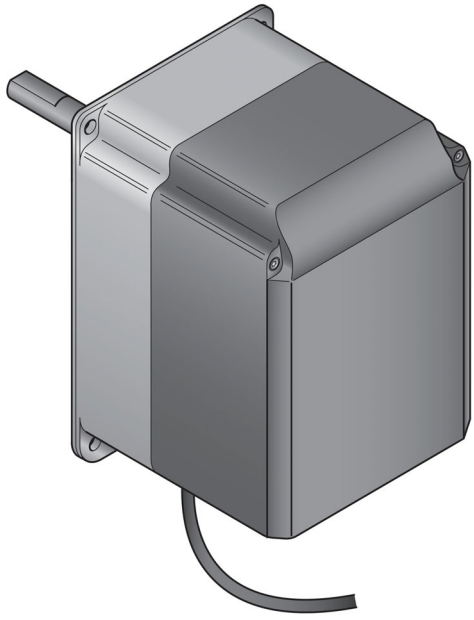


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Fig. 7

Technical data

Model	SQM45.295A9
Operating voltage	AC 2 x 12 V via bus cable from the basic unit or via a separate transformer
Safety class	Extra low-voltage with safe isolation from mains voltage
Power consumption	9...15 VA
Degree of protection	To EN 60 529, IP 54, provided adequate cable entries are used
Electrical connections	RAST3.5 terminals
Direction of rotation (when facing the shaft)	- Standard: counterclockwise - Reverse: clockwise
Running time (min.) for 90°	10 s.
Holding torque (max.)	1.5 Nm
Nominal torque (max.)	3 Nm
Weight	approx. 1 kg
Environmental conditions:	
Operation	DIN EN 60721-3-1
Climatic conditions	class 1K3
Mechanical conditions	class 1M2
Temperature range	-20...+60 ×C
Humidity	< 95 % r.h.

Tab. I

WARNING

Condensation, formation of ice and the entrance of water are not permitted!

4.14 PLL52... module (optional)

Warnings

WARNING

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

Avoid opening, modifying or forcing the device.

➤ All interventions (assembly and installation operations, assistance, etc.) must be carried out by qualified personnel.
➤ Falls and collisions can negatively affect the safety functions. In this case, the unit must not be operated, even if it displays no evident damage.

Assembly notes

- Check the relevant national safety standards are respected.

4.14.1 Terminal ratings, cable lengths and cross-sectional areas

Cable lengths / cross-sectional areas	
Electrical connection “X89”	Screw terminals up to max. 2.5 mm^2
Cable lengths	≤ 10 m fino a QGO20...
Cross-sectional areas	Refer to description of QGO20...
Analog inputs	
Air temperature detector	Pt1000 / LG-Ni1000
Flue gas temperature	Pt1000 / LG-Ni1000
QGO20...	Refer to data sheet N7842
Interface	Communication bus for LMV52...

Tab. J

Fig. 8

Technical data

Model	**PLL52...**
Mains voltage “X89-01”	AC 230 V -15%/10%
Safety class	I class with parts according to II class (DIN EN 60730-1)
Mains frequency	50 / 60 Hz ±6 %
Power consumption	Ca. 4 VA
Degree protection	IP54, housing closed
Transformer AGG5.220	
- Primary side	AC 230V
- Secondary side	AC 12 V (3x)
Environmental conditions:	
Storage	DIN EN 60721-3-1
Climatic conditions:	Class 1K3
Mechanical conditions:	Class 1M2
Temperature range:	-20...+60 °C
Humidity:	<95% r.h.
Transport	DIN EN 60721-3-2
Climatic conditions:	Class 2K2
Mechanical conditions:	Class 2M2
Temperature range:	-25...+70 °C
Humidity:	<95% r.h.
Operation	DIN EN 60 721-3-1
Climatic conditions:	Class 3K5
Mechanical conditions:	Class 3M2
Temperature range:	-20...+60 °C
Humidity:	< 95% r.h.

Tab. K

NOTE:
For detailed information, refer to the specific manual of PLL52 module.

WARNING

Condensation, formation of ice and the entrance of water are not permitted!

4.15 Oxygen sensor QGO20 ... (optional)

Warnings

WARNING

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

Avoid opening, modifying or forcing the oxygen sensor.

- All interventions (assembly and installation operations, assistance, etc.) must be carried out by qualified personnel.
- Before modifying the wiring in the sensor connection area, fully disconnect the burner control device from the power supply (omnipolar separation).
- Ensure that the sensor cannot be inadvertently switched on again and check this by making a voltage test.
- To avoid the risk of electrocution, protect the connection terminals in a suitable manner and correctly fix the cover.
- During operation, the flange of the sensor connection must be kept closed; all screws must be tightened securely.
- Check the wiring is in order.
- Falls and collisions can negatively affect the safety functions. In this case, the unit must not be operated, even if it displays no evident damage.
- Ensure that the device does not get into contact with explosive or inflammable gases.
- There is a risk of burning since the measuring cell works at an operating temperature of 700 °C and other accessible parts can get very hot too (> 60 °C).
- To prevent injury caused by the hot immersion tube, remove the device only after the equipment has cooled down.
- Make certain that the sensor's inlet and outlet are always kept free from dirt.
- Before cleaning the inlet and outlet, allow the sensor to cool down for at least 1 hour.
- Mount the sensor such that the connecting part (head to flange) is free so that the exchange of air is ensured. Otherwise, measurements might get distorted, possibly leading to dangerous situations.
- Ensure that there are no chemicals, such as solvent vapors, near the sensor.

Installation notes

- The flue gas flow passing the measuring cell must be homogeneous, with no or only little turbulence. When mounted too close to air dampers or pipe bends, faulty measurements can occur.
- A number of faults can distort the measurements (this can lead to dangerous situations in connection with oxygen trim control):
  - If the stack is not tight, false air can join the flue gases.
  - In that case, the residual oxygen content indicated by the sensor is higher than it actually is.
  - If the flue gas velocity is low, the sensor's response is slower, since the flue gases take more time to pass the measuring cell. In that case, it is recommended to mount the sensor in an inclined position (refer to the manual).
  - The greater the sensor's distance from the flame, the longer the dead time.

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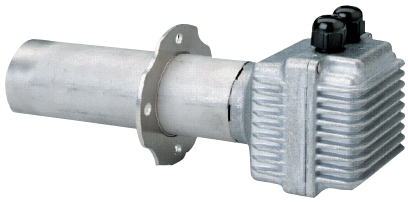

Fig. 9

NOTE:

For further explanations about the wiring connetions, please refer to the manual supplied with the accessory code 20045187.

WARNING

Condensation, formation of ice and the entrance of water are not permitted!

4.15.1 Technical data QGO20

Operating voltage of measuring cell's:	
– QGO20.000D27 – QGO20.000D17	AC 230 V ±15 % AC 120 V °15 % (only with LMV52 ... with PLL52...)
Mains frequency:	50...60 Hz ±6 %
Power consumption:	Max. 90 W, typical value 35 W (controlled)
Permissible mounting position:	Refer to mounting Instructions M7842
Degree of protection:	IP40, to be ensured through installation
Weight (net):	approx. 0.9 kg
Signal lines – Shielded 6-wires cable – Shielding connected to terminal GND of the PL52...	Twisted pairs
Wire diameter	LifYCY3x2x0,2 o LYCY3x2x0,2
Measuring system	Zirconium dioxide measuring cell as an oxygen ion conductor
Permissible flue gas velocity (only with AGO20...)	1...10 m/s
Fuel type	Fuel oil EL or Natural gas H
Measuring range	0.2...20.9 % O_2
Permissible cable length	Max. 100 m
Wire diameter	<10 m
Power supply lines (Net cable) – Cable diameter – Cable type	Min. 1 mm² QGO20.000D27: e.g. NYM 3 x 1,5 QGO20.000D17: UL AWM Style 1015/MTW or CSA-AWM/TEW
Required operating temperature of measuring cell	700 °C ±50 °C
Environmental conditions	
Storage	DIN EN 60721-3-1
Climatic conditions:	Class 1K3
Mechanical conditions:	Class 1M2
Temperature range:	-20...+60 °C
Humidity:	<95% r.h.
Transport	DIN EN 60721-3-2
Climatic conditions:	Class 2K2
Mechanical conditions:	Class 2M2
Temperature range:	-25...+70 °C
Humidity:	<95% r.h.
Operation	DIN EN 60721-3-3
Climatic conditions:	Class 3K5
Mechanical conditions:	Class 3M2
Temperature range: – Flange – Connecting head – Flue gases	 Max. 250 °C Max. 70 °C ≤300 °C
Humidity:	<95% r.h.
Installation altitude:	Max. 2000 m a.s.l.

Tab. L

4.16 Calibration of the thermal relay

The thermal relay serves to avoid damage to the motor due to an excessive absorption increase or if a phase is missing.
For calibration 2), see the table in the wiring diagram.
To reset, in case of an intervention of the thermal relay, press the "RESET" button 1) of Fig. 10.
The red “TEST” button 3) opens the NC (95-96) contact and stops the motor.

CAUTION

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

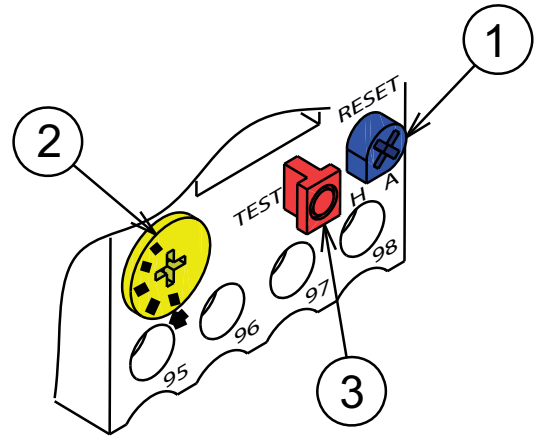

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Fig. 10

5 Installation

5.1 Notes on safety for the installation

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

DANGER

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

WARNING

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

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

5.2 Handling

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

WARNING

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

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

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; but 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. 11) 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**).

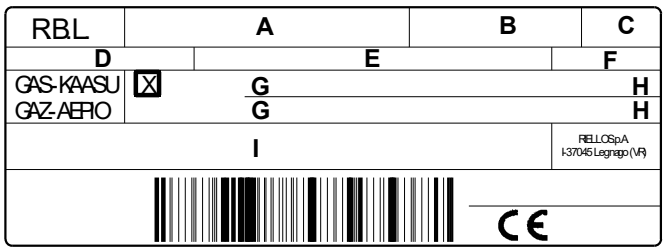

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Fig. 11

WARNING

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

5.4 Operating position

WARNING

- ➤ The burner is designed to operate only in positions **1**, **2**, **3** and **4** (Fig. 12).
- ➤ Installation **1** is preferable, as it is the only one that allows the maintenance operations as described in this manual.
- ➤ Installations **2**, **3** and **4** permit operation but make maintenance and inspection of the combustion head more difficult.

DANGER

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

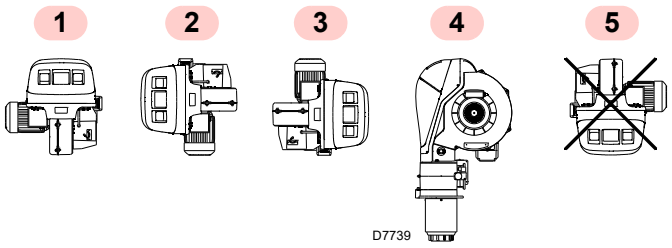


Fig. 12

5.5 Preparing the boiler

5.5.1 Boring the boiler plate

Drill the combustion chamber locking plate as shown in Fig. 13 (). The position of the threaded holes can be marked using the thermal screen supplied with the burner.

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.
For boilers with front flue passes 1)(Fig. 14) or flame inversion chamber, a protection in refractory material 5) must be inserted between the boiler fettling 2) and the blast tube 4).
The refractory can have a conical shape (minimum 60°).
This protective fettling must not compromise the extraction of the blast tube.
For boilers with a water-cooled front piece, a refractory lining 2)-5)(Fig. 14) is not necessary, unless expressly requested by the boiler manufacturer.

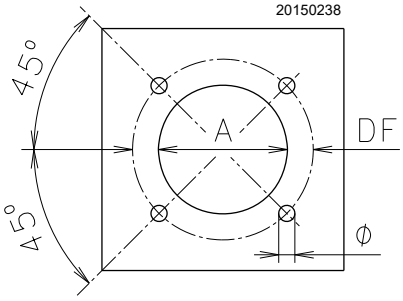


Fig. 13

mm	A	B	C
RS 310/E O_2 BLU	335	452	M18
RS 410/E O_2 BLU	335	452	M18
RS 510/E O_2 BLU	335	452	M18
RS 610/E O_2 BLU	350	452	M18

Tab. M

5.6 Securing the burner to the boiler

Prepare a suitable lifting system using the rings 3) (Fig. 14), after removing the fixing screws 7) of the casing 8).

- ➤ Fit the heat insulation supplied onto the blast tube (4)(Fig. 14).
- ➤ Fit the entire burner onto the boiler hole prepared previously (Fig. 13), and fasten with the screws supplied.

WARNING

The seal between burner and boiler must be airtight.

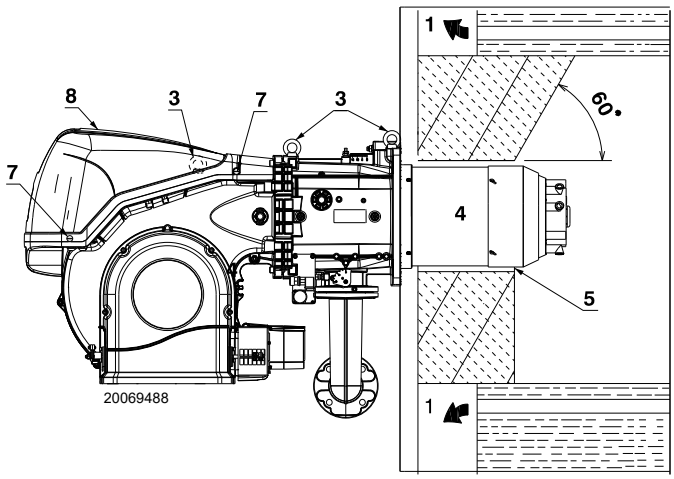


Fig. 14

5.7 Access to head internal part

The burner leaves the factory set for opening to the left, therefore maintaining the pin 1)(Fig. 15) in the housing.
To open the burner towards the left, proceed as follows:

A Disconnect the plug/socket 9)(Fig. 15) of the maximum gas pressure switch;
B Remove the screws 2);
C Open the burner to a maximum of 100-150 mm by rotating around the hinge and release the cables of the probe 5) and electrode 11);
D Fully open the burner as in Fig. 15;
F Undo the screw 4) with pressure test point.
G Release the head by lifting it from its housing 3), then take out the combustion head.

WARNING

To open the burner from the opposite side, before removing the pin 1)(Fig. 15), make sure that the 4 screws 2) are tight. Then shift the pin 1) to the opposite side, only then is it possible to remove the screws 2). Disconnect the socket 9 (Fig. 15) of the maximum gas pressure switch, then proceed as described above at point **C)**.

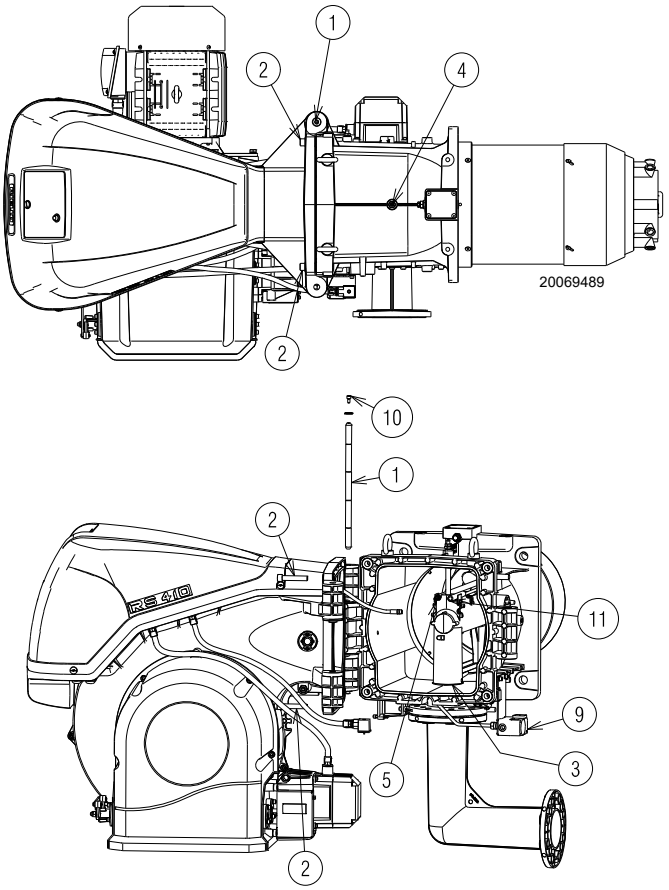


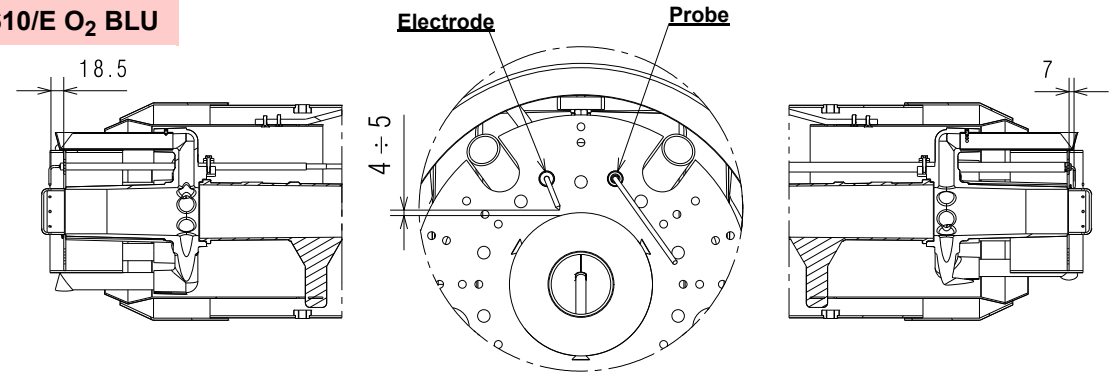
Fig. 15

5.8 Probe-electrode position

WARNING

Check that the probe and the electrode are placed as in Fig. 16, according to the dimensions indicated.

RS 410-510-610/E O_2 BLU



RS 310/E O_2 BLU

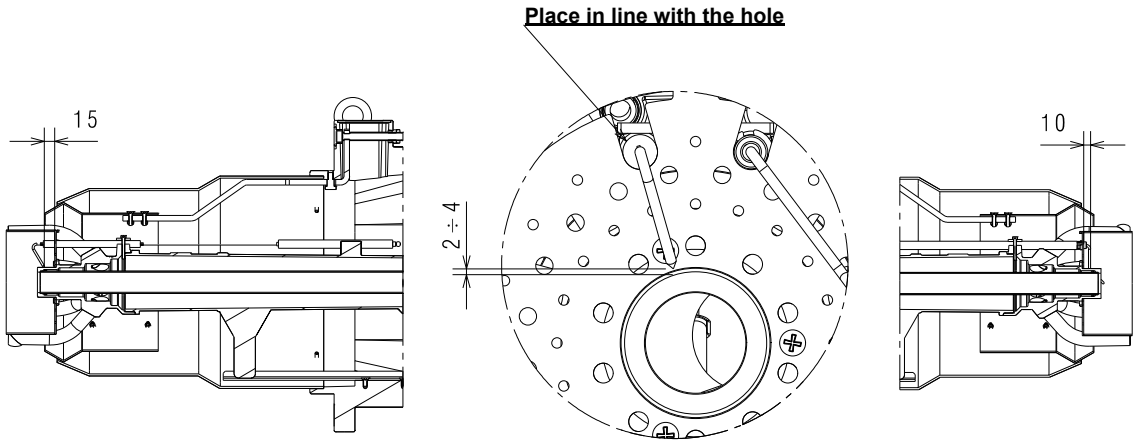


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Fig. 16

5.9 Gas butterfly valve

If necessary, replace the gas butterfly valve. The correct position is shown in Fig. 17.

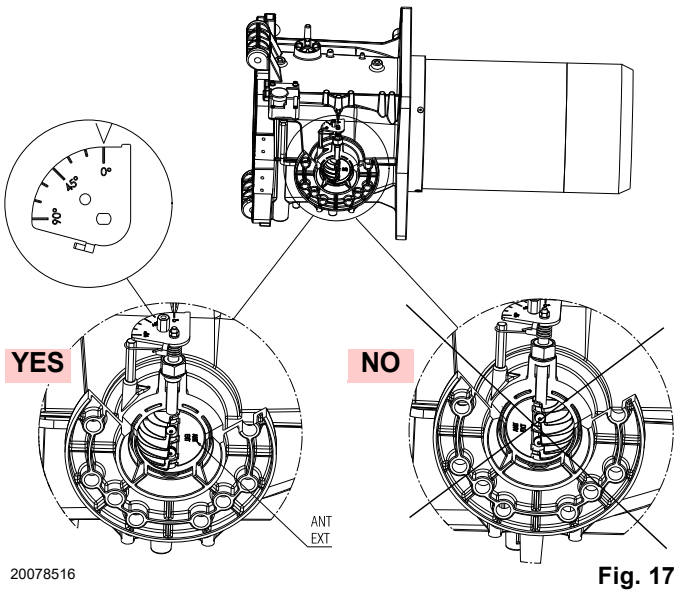

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Fig. 17

5.10 Combustion head adjustment

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

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

The combustion head is closed by turning the screw 1) clockwise (Fig. 20)

WARNING

The burner leaves the factory with the combustion head set at notch 0 (Fig. 20).

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

Before starting up the burner, carry out the settings according to the required output and indicated in the diagram (Fig. 18).

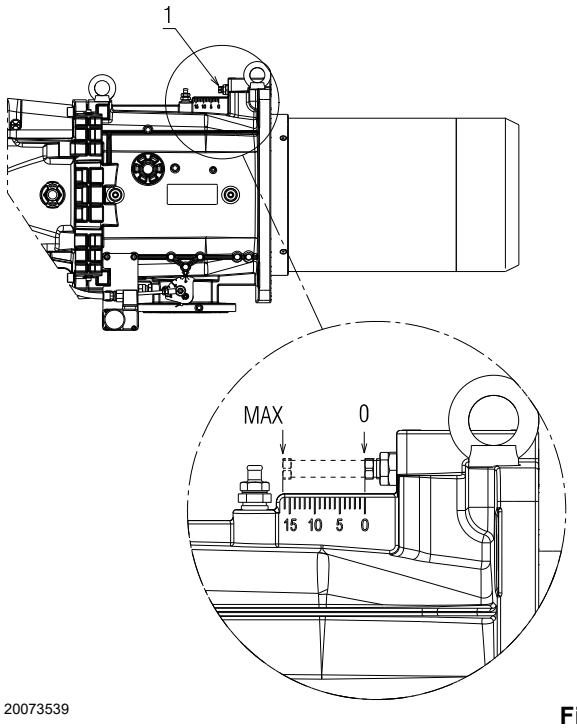

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Fig. 18

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

Only for the RS 310/E O_2 BLU model:

The RS 310/E O_2 BLU burner is equipped with central air/gas adjustment. The factory setting is the following:

AIR = notch 9

GAS = notch 0.

WARNING

Do not change these settings!

Only for specific cases, to change the central gas setting, do as follows:

➤ loosen the screws 1) and rotate the ring nut 3) until the notch you have found corresponds with the indicator 4) (Fig. 19).

To change the central air setting, do as follows:

➤ loosen the screws 1) and rotate the ring nut 2) until the notch you have found corresponds with the screw 1);

➤ Block the 2 screws 1)(Fig. 19).

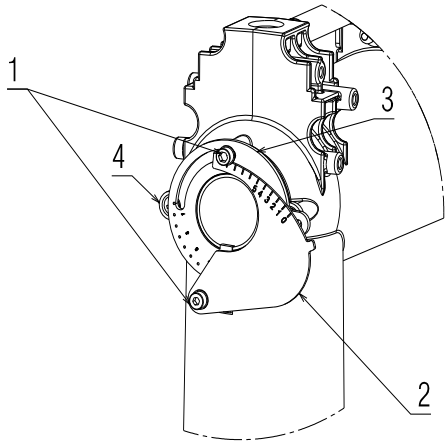

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Fig. 19

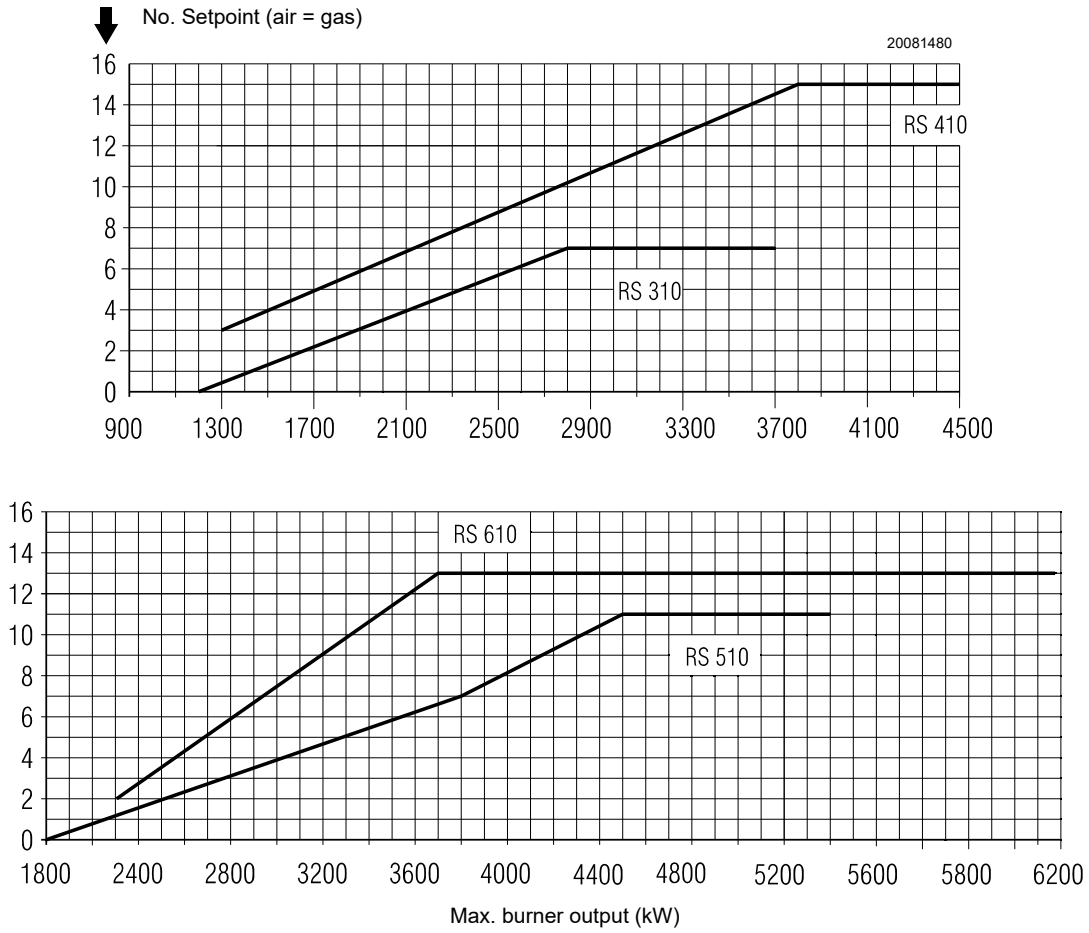

No. Setpoint (air = gas)
20081480
16
14
12
10
8
6
4
2
0
900
1300
1700
2100
2500
2900
3300
3700
4100
4500
RS 410
RS 310
16
14
12
10
8
6
4
2
0
1800
2400
2800
3200
3600
4000
4400
4800
5200
5600
5800
6200
RS 610
RS 510
Max. burner output (kW)

Fig. 20

5.11 Gas pressures

Explosion danger due to fuel leaks in the presence of a flammable source.
Precautions: avoid knocking, attrition, sparks and heat.
Make sure the fuel interception tap is closed before performing any operation on the burner.

WARNING

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

5.11.1 Gas feeding line

Key (Fig. 21 - Fig. 22 - Fig. 23 - Fig. 24)

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

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

6C Includes
- safety valve
- working valve

6D Includes:
- safety valve
- working valve

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

MBC "threaded"

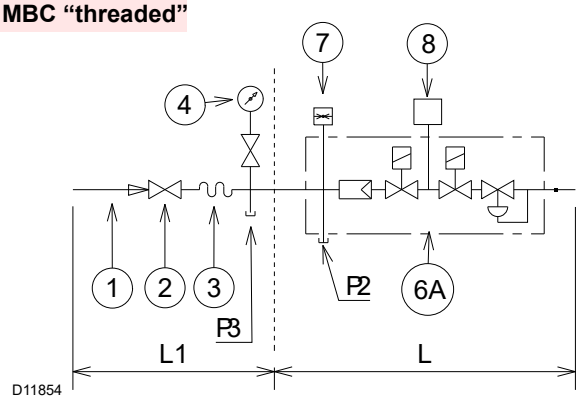


Fig. 21

MBC "flanged"

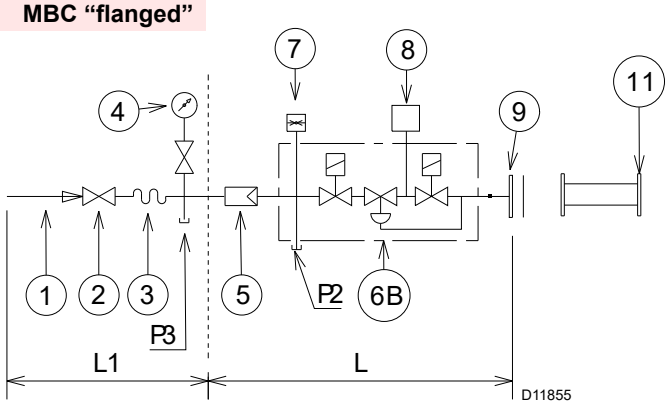


Fig. 22

DMV "flanged or threaded"

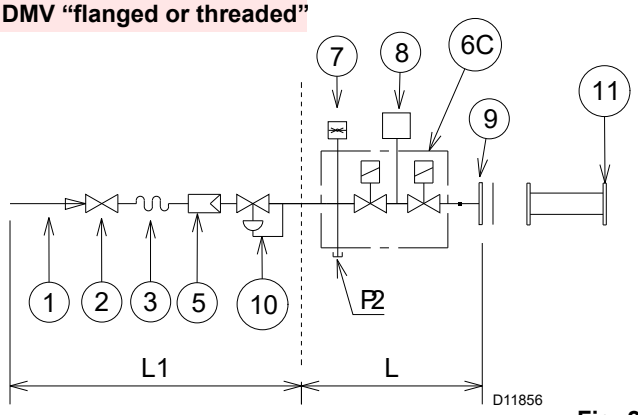


Fig. 23

CB "flanged or threaded"

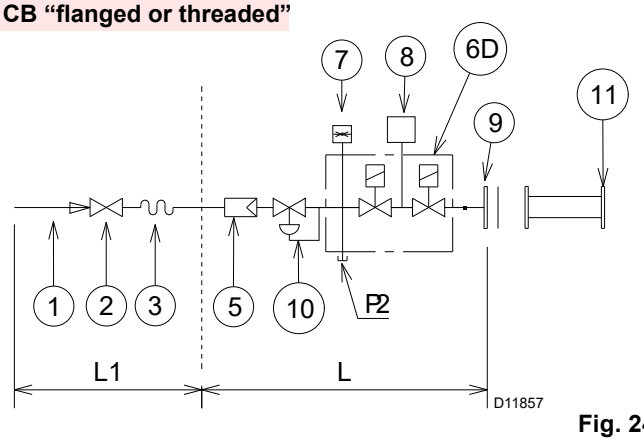


Fig. 24

5.11.2 Gas train

Approved according to standard EN 676 and provided separately from the burner.
To select the correct gas train model, refer to the supplied "Burner-gas train combination" manual.

5.11.3 Gas train installation

Disconnect the electrical power using the main switch.

Check that there are no gas leaks.

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

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

The operator must use the required equipment during installation.

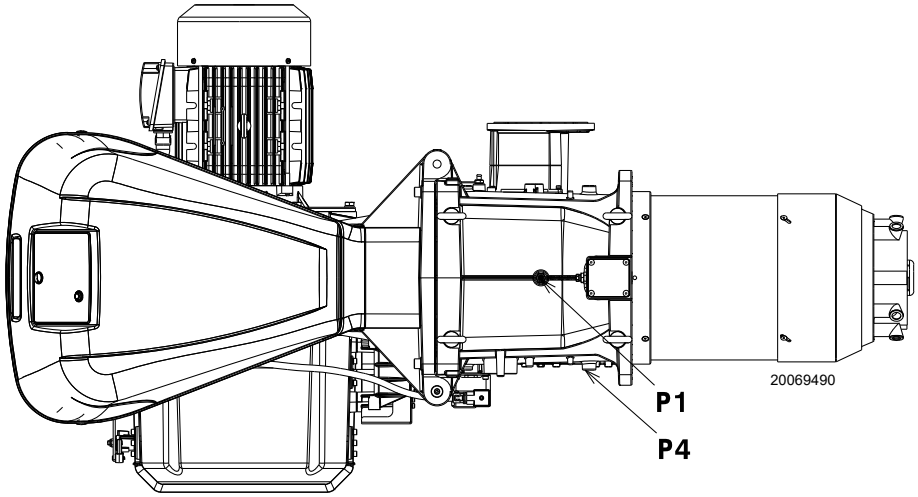


Fig. 25

5.11.4 Gas pressure

Tab. N indicates the minimum pressure drops along the gas supply line, depending on the maximum burner output.

The values shown in Tab. N refer to:
– Natural gas G 20 NCV 9.45 kWh/Sm^3 (8.2 Mcal/Sm^3)
– Natural gas G 25 NCV 8.13 kWh/Sm^3 (7.0 Mcal/Sm^3)

Column 1

Combustion head pressure drop.
Gas pressure measured at the test point P1)(Fig. 25), with:
- Combustion chamber at 0 mbar;
- Burner working at maximum output;
- Combustion head adjusted as in pag. 26.

Column 2
Pressure loss at gas butterfly valve 14)(Fig. 4 on pag. 13) with maximum opening: 90°.

Calculate the approximate maximum output of the burner in this way:
– subtract the combustion chamber pressure from the gas pressure measured at test point P1)(Fig. 25).
– Find, in the table Tab. N related to the burner concerned, the pressure value closest to the result of the subtraction.
– Read the corresponding output on the left.

Example RS 410/E O_2 BLU with G20 natural gas:
Maximum output operation
Gas pressure at test point P1)(Fig. 25) = 58.1 mbar
Pressure in combustion chamber = 5 mbar
58.1 - 5 = 53.1 mbar

A pressure of 53.1 mbar, column 1, corresponds in the table Tab. N to an output of 4450 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 P1)(Fig. 25), set the MAX output required from the burner operation:
– find the nearest output value in the table Tab. N for the burner in question.
– Read, on the right (column 1), the pressure at the test point P1)(Fig. 25).
– Add this value to the estimated pressure in the combustion chamber.

Example for RS 410/E O_2 BLU with G20 natural gas:
Required burner maximum output operation: 4450 kW
Gas pressure at an output of 4450 kW = 53.1 mbar
Pressure in combustion chamber = 5 mbar
53.1 + 5 = 58.1 mbar
Pressure required at test point P1)(Fig. 25).

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

	kW	1 Δp (mbar)		2 Δp (mbar)	
		G 20	G 25	G 20	G 25
RS 310/E O_2 BLU	1200	23,1	34,5	0,1	0,1
	1440	23,6	35,2	0,5	0,7
	1690	24,1	36,0	1,1	1,6
	1930	24,6	36,7	2,1	3,1
	2170	25,1	37,4	3,1	4,6
	2420	26,7	39,8	4,2	6,3
	2660	29,6	44,2	5,3	7,9
	2900	33,4	49,8	6,4	9,5
	3140	38	56,7	7,6	11,3
	3390	43,7	65,2	8,8	13,1
	3630	50,1	74,7	10	14,9
RS 410/E O_2 BLU	1500	2,6	3,9	0,3	0,5
	1800	7,1	10,6	1,5	2,2
	2090	11,5	17,2	2,8	4,2
	2380	16,1	24,0	4,0	6,0
	2680	21,1	31,5	5,4	8,1
	2980	26,1	38,9	6,8	10,1
	3270	31,2	46,6	8,2	12,2
	3560	36,3	54,2	9,6	14,3
	3860	41,9	62,5	11,2	16,7
	4160	47,5	70,9	12,7	18,9
	4450	53,1	79,2	14,3	21,3
RS 510/E O_2 BLU	1800	14,0	20,9	1,5	2,2
	2140	15,5	23,1	3,0	4,5
	2490	17,8	26,6	4,5	6,7
	2840	20,7	30,9	6,1	9,1
	3180	24,2	36,1	7,8	11,6
	3520	28,3	42,2	9,4	14,0
	3870	33,3	49,7	11,2	16,7
	4220	39,0	58,2	13,0	19,4
	4560	45,2	67,4	14,9	22,2
	4900	52,0	77,6	16,8	25,1
	5250	59,7	89,1	18,8	28,0
RS 610/E O_2 BLU	2200	9,3	13,9	3,3	4,9
	2600	13,6	20,3	5,0	7,5
	3010	18,6	27,8	7,0	10,4
	3420	24,1	36,0	8,9	13,3
	3820	30,1	44,9	11,0	16,4
	4220	36,5	54,5	13,0	19,4
	4630	43,7	65,2	15,3	22,8
	5040	51,5	76,8	17,6	26,3
	5440	59,6	88,9	19,9	29,7
	5840	68,2	101,8	22,3	33,3
	6250	77,6	115,8	27,8	37,0

Tab. N

5.12 Electrical wiring

Notes on safety for the electrical wiring


DANGER

- The electrical wiring must be carried out with the electrical supply disconnected.
- Electrical wiring must be made in accordance with the regulations currently in force in the country of destination and by qualified personnel. Refer to the wiring diagrams.
- The manufacturer declines all responsibility for modifications or connections different from those shown in the wiring diagrams.
- Check that the electrical supply of the burner corresponds to that shown on the identification label and in this manual.
- The RS 310-410/E O_2 BLU burners equipped with LMV5... can operate in FS1 or FS2 mode. See specific manual LMV5... for continuous/intermittent operation. Refer to the following notes for the type of operation that has been set.
- The FS1 burners have been set for intermittent operation. This means that the burner should compulsorily be stopped at least once every 24 hours to enable the electric control box to check its own safety and efficiency at start-up. Normally the boiler's thermostat/pressure switch ensures that the burner stops. If this is not the case, a time switch should be fitted in series to TL to stop the FS1 burner at least once every 24 hours. Refer to the wiring diagrams.
- The FS2 burners have been set for continuous operation. This means that the burner should compulsorily be stopped at least once every 72 hours to enable the electric control box to check its own safety and efficiency at start-up. 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 FS2 burner at least once every 72 hours. Refer to the wiring diagrams.
- The electrical safety of the device is obtained only when it is correctly connected to an efficient earthing system, made according to current standards. It is necessary to check this fundamental safety requirement. In the event of doubt, have the electrical system checked by qualified personnel. Do not use the gas tubes as an earthing system for electrical devices.
- The electrical system must be suitable for the maximum power absorption of the device, as indicated on the label and in the manual, checking in particular that the section of the cables is suitable for that level of power absorption.
- For the main power supply of the device from the electricity mains:
  - do not use adapters, multiple sockets or extensions;
  - use a multiple pole switch with at least a 3 mm gap between the contacts (overvoltage category III), as envisaged by the present safety standards.
- Do not touch the device with wet or damp body parts and/or in bare feet.
- Do not pull the electric cables.
- Check the electric wiring inside the boiler complies with the national and local safety regulations.
- Live and neutral should not be mixed up (this could cause dangerous malfunctions, a loss of protection against electric shocks, etc..).
- Make sure the cable grommets of the connected cables comply with the relevant standards (e.g. EN60730 and EN60 335).
- When wiring the unit, make sure that AC 230V mains voltage cables are run strictly separate from extra low-voltage cables to avoid risks of electrical shock hazard.

Before carrying out any maintenance, cleaning or checking operations:


DANGER

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


DANGER

Turn off the fuel interception tap.


DANGER

Avoid condensate, ice and water leaks from forming.

If the cover is still present, remove it and proceed with the electrical wiring according to the wiring diagrams.
Use flexible cables in compliance with the EN 60 335-1 standard.

5.12.1 Supply cables and external connections passage

All the cables to be connected to the burner must be threaded through cable grommets. The use of the cable grommets can take various forms; by way of example see Fig. 26.

Key (Fig. 26)

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

A Fan motor
B Maximum gas pressure switch
C Servomotors

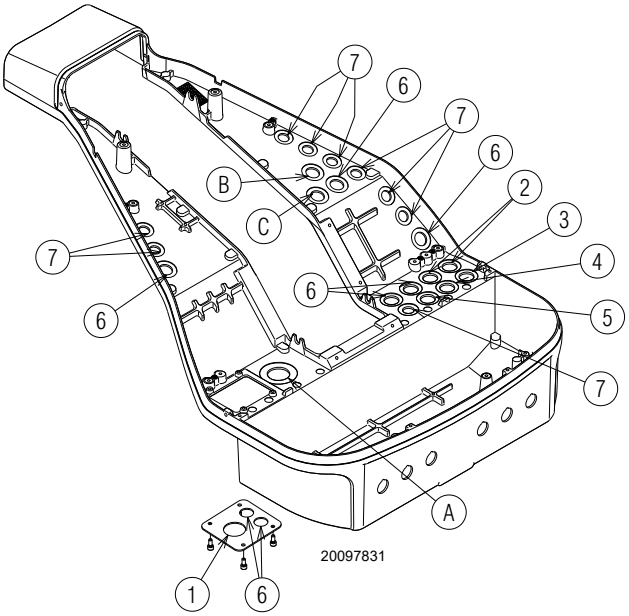


Fig. 26

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

6 Start-up, calibration and operation of the burner

6.1 Notes on safety for the first start-up

WARNING

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

WARNING

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

WARNING

Before igniting the burner, see the paragraph vedi “Safety test - with gas feeding closed” a pag. 39.

6.2 Adjustments prior to ignition

Combustion head adjustment has already been already described in the section “Combustion head adjustment” on pag. 26.
In addition, the following adjustments must also be made:

- Open manual valves upstream from the gas train.
- Adjust the minimum gas pressure switch to the start of the scale.
- Adjust the maximum gas pressure switch to the end of the scale.
- Adjust the air pressure switch to the start of the scale.
- Adjust the pressure switch for the leak detection control (PVP kit)(Fig. 36 on pag. 41) according to the instructions supplied with the kit.
- Purge the air from the gas line.
  We recommend using a plastic tube routed outside the building and to purge air until gas is smelt.
- Fit a U-type pressure gauge or a differential pressure gauge (Fig. 27), with socket (+) on the gas pressure of the pipe coupling and (-) in the combustion chamber.
  The manometer readings are used to calculate MAX burner output using the Tab. N.
- Connect two lamps or testers to the two gas line solenoids to check the exact moment in which voltage is supplied. This operation is unnecessary if each of the two solenoids is equipped with a pilot light that signals voltage passing through.

CAUTION

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

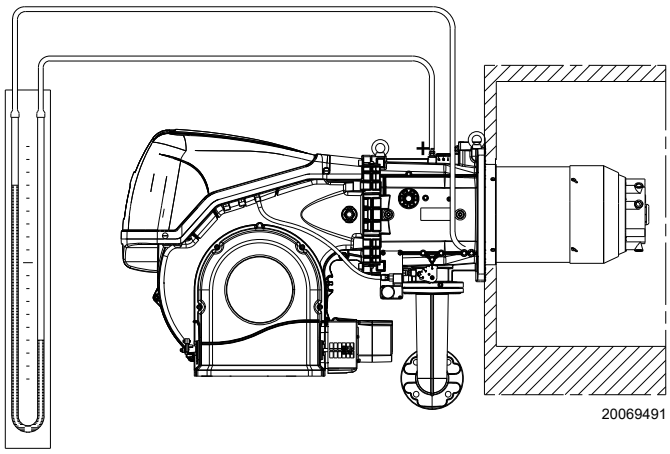


Fig. 27

6.3 Burner start-up

Feed electricity to the burner via the disconnecting switch on the boiler panel.

Close the thermostats/pressure switches. Turn the switch of Fig. 28 to position **"AUTO"**.

DANGER

Make sure that the lamps or testers connected to the solenoids, or indicator lights on the solenoids themselves, show that no voltage is present. If voltage is present, stop the burner **immediately** and check the electrical wiring. When the burner starts, check the direction of the motor rotation, as indicated in Fig. 28.

As the burner is not fitted with a device to check the sequence of the phases, the motor rotation may be incorrect. As soon as the burner starts up, go in front of the cooling fan of the fan motor and check it is rotating anticlockwise.

If this is not the case:

➤ place the switch of Fig. 28 in position **"0"** and wait for the control box to carry out the switch-off phase;

➤ disconnect the electrical supply from the burner;

invert the phases on the three-phase power supply.

Once the above steps are complete, the burner should light.

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

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

The arrival of gas at the pipe coupling is indicated by the U-type pressure gauge (Fig. 27).

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

WARNING

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.

DANGER

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).

Once the burner has ignited, proceed with the global adjustment of the burner.

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

WARNING

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

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

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

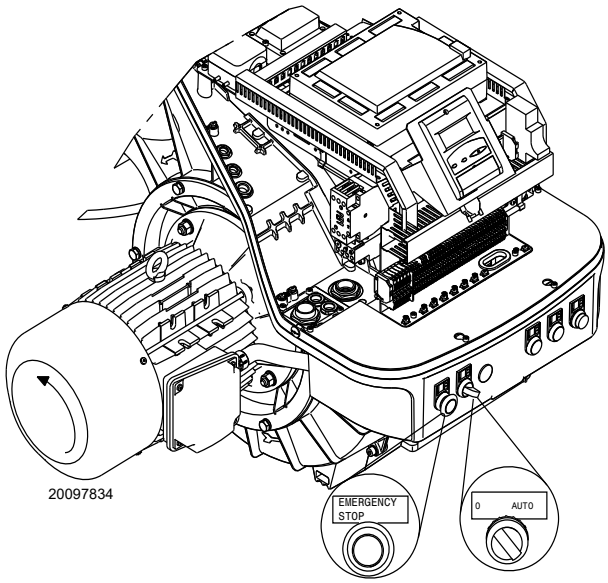


Fig. 28

6.4 Air / fuel adjustment

Air/fuel synchronisation is carried out with the relevant air and gas servomotors by logging a calibration curve by using the electronic cam.
It is advisable, to reduce the loss and for a wide calibration field, to adjust the servomotors to the maximum of the output used, the nearest possible to the maximum opening (90°).

The choking of the air, taking into account the maximum combustion output, takes place by varying the adjustment of the combustion head (vedi "Combustion head adjustment" a pag. 26.).
On the gas butterfly valve, the fuel step according to the burner output required, with servomotor completely open, is carried out by the pressure stabiliser on the gas train.

6.4.1 Air adjustment for maximum output

➤ Adjust the servomotor to maximum opening (nearly 90°) so that the air butterfly valves are entirely open 17) Fig. 4 on pag. 13.

6.4.2 Air/fuel adjustment and output modulation system

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

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

6.4.3 Burner adjustment

The optimum adjustment of the burner requires an analysis of flue gases at the boiler outlet.
Adjust in sequence:
1 - Output upon ignition
2 - MAX output
3 - MIN output
4 - Intermediate outputs between Min. and Max.
5 - Air pressure switch
6 - Maximum gas pressure switch
7 - Minimum gas pressure switch

6.4.4 Output upon ignition

Ignition must occur at a lower output than the max. operation output. Regulations provide that the ignition output of this burner must be equal to or less than 1/3 of the MAX operation output.
Example:
MAX operation output of 600 kW.
The ignition output must be equal to or less than 200 kW with ts = 3s
In order to measure the ignition output:

➤ disconnect the plug-socket 13)(Fig. 4 on pag. 13) on the ionisation probe cable (the burner will fire and then go into lockout after the safety time has elapsed);
➤ perform 10 consecutive ignitions with lockouts;
➤ on the meter, read the quantity of gas burned:

This quantity must be equal to, or lower than, the quantity given by the formula, for ts = 3s:

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

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

Example for gas G20 (9.45 kWh/Sm^3):
ignition output 200 kW corresponding to

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

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

$$\mathbf{Vg} = \frac{\mathbf{21.16\ x\ 10\ x\ 3}}{\mathbf{3600}} = \mathbf{0{,}176\ Sm^3}$$

Air adjustment
The adjustment of the air is carried out by changing the angle of the air damper (17) Fig. 4 on pag. 13) changing the degrees of the air servomotor inside the electronic cam programme.

6.4.5 Maximum output

The MAX output must be set within the firing rate (Fig. 2 on pag. 11).

Adjustment of gas delivery
Measure the gas delivery on the gas meter.
– If it is necessary to reduce it, lower the output gas pressure via the pressure adjuster located beneath the gas valve.
– If delivery needs to be increased, increase the adjuster outlet gas pressure.

Air adjustment
If necessary vary the degrees of the air servomotor.

6.4.6 Minimum output

The MIN output must be set within the firing rate (Fig. 2 on pag. 11).

6.5 Final adjustment of the pressure switches

6.5.1 Air pressure switch

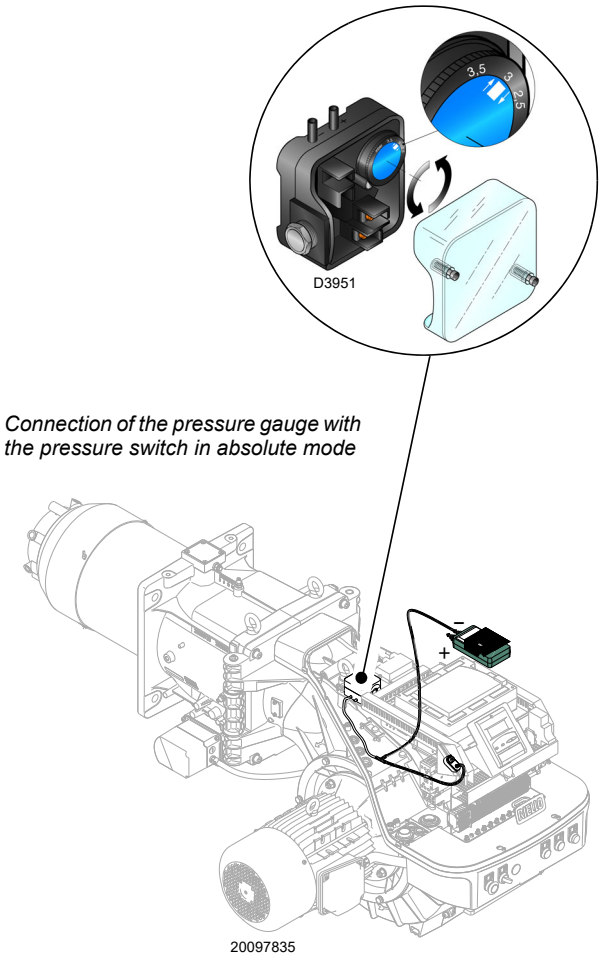
Adjust the air pressure switch (Fig. 29) after performing all other burner adjustments with the air pressure switch set to the start of the scale.
With the burner operating at minimum output, insert a combustion analyser in the stack, slowly close the suction inlet of the fan (for example, with a piece of cardboard) until the CO value does not exceed 100 ppm.
Slowly turn the appropriate knob clockwise until the burner goes into lockout.
Check the indication of the arrow pointing upwards on the graduated scale. Turn the knob clockwise again, until the value shown on the graduated scale corresponds with the arrow pointing downwards, and so recovering the hysteresis of the pressure switch (shown by the white mark on a blue background, between the two arrows).
Now check the correct start-up of the burner. If the burner locks out again, turn the knob anti-clockwise a little bit more. During these operations it may be useful to measure the air pressure with a pressure gauge.
The connection of the pressure gauge is shown in Fig. 29. The standard configuration is that with the air pressure switch connected in absolute mode. Note the presence of a “T” connection, not supplied.
In certain applications in strong depression situations, the connection of the pressure switch does not allow it to change over.
In this case it is necessary to connect the pressure switch in differential mode, applying a second tube between the air pressure switch and the fan suction line mouth.
In this case also, the pressure gauge must be connected in differential mode, as shown in Fig. 29.

6.5.2 Maximum gas pressure switch

Adjust the maximum gas pressure switch (Fig. 30) after performing all other burner adjustments with the maximum gas pressure switch set to the end of the scale.
With the burner operating at maximum output, lower the adjustment pressure by slowly turning the relative knob anticlockwise until the burner locks out.
Now turn the knob clockwise 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 clockwise again by 0.1 kPa (1 mbar).

WARNING

1 kPa = 10 mbar



Connection of the pressure gauge with the pressure switch in absolute mode

Fig. 29

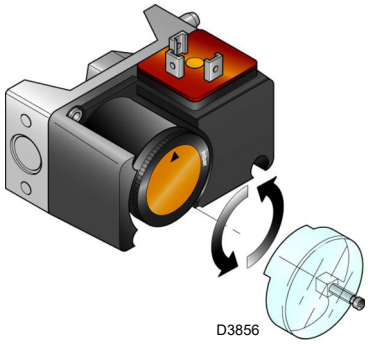


Fig. 30

6.5.3 Minimum gas pressure switch

Adjust the minimum gas pressure switch (Fig. 31) after performing all the other burner adjustments with the pressure switch set to the start of the scale.
With the burner operating at maximum output, increase adjustment pressure by slowly turning the relative knob clockwise until the burner stops.
Now 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).

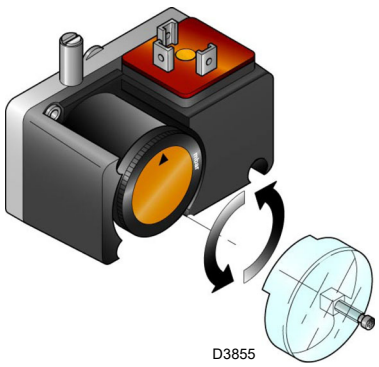


Fig. 31

6.5.4 PVP pressure switch kit

Adjust the pressure switch for the leak detection control (PVP kit)(Fig. 32) according to the instructions supplied with the kit.

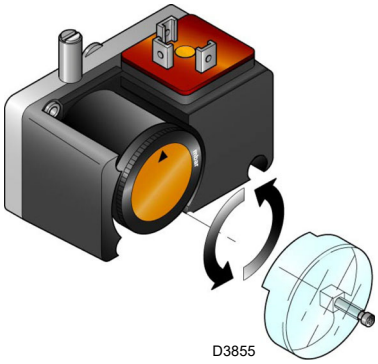


Fig. 32

WARNING

1 kPa = 10 mbar

6.6 Final checks (with burner operating)

➤ Open the thermostat/pressure switch TL ➤ Open the thermostat/pressure switch TS	⇨	The burner must stop
➤ Turn the gas maximum pressure switch knob 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 connector of the ionisation probe	⇨	The burner must stop in lockout due to ignition failure

Tab. O

WARNING

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

6.7 Motor lockout

If the motor does not start, it could be because of a thermal relay intervention due to its incorrect calibration or problems with the motor or the main power supply, to release press the button of the thermal relay, see “Calibration of the thermal relay” on pag. 21.

6.8 Description of O_2 trim control (optional)

A special feature of the LMV52… is control of the residual O_2 content to increase the boiler's efficiency. The LMV52… uses a QGO20…, an external PLL52…, and the standard components of the LMV51… The PLL52… is a detached measuring module for the O_2 sensor and for 2 temperature sensors (Pt1000 / LG-Ni1000). The module communicates with the LMV52… via CAN bus.

The following generic diagram shows the system (Fig. 33).

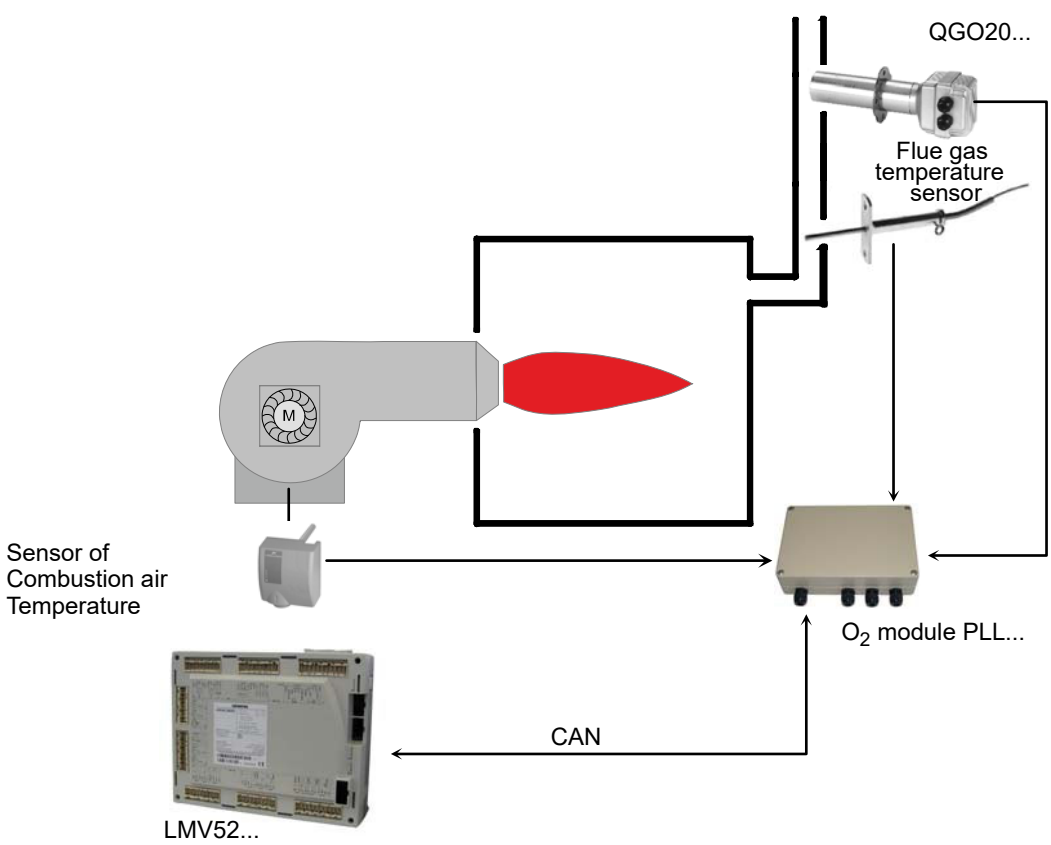


Fig. 33

6.8.1 Operating principle of O_2 trim control

The residual O_2 control system reduces the amount of combustion air depending on the control deviation (O_2 setpoint minus actual of O_2). The amount of combustion air is normally influenced by several actuators and, if used, by a VSD. **Reduction of the amount of air is reached by reducing the «air rate» of the air-regulating actuators.**

For that purpose, the damper positions of these actuators are calculated from some other load point on the ratio control curves. Hence, due to the parameterized ratio control curves, the air-regulating actuators are in a fixed relation to one another.

O_2 trim control is supported by **precontrol. Precontrol calculates the air rate reduction such that changes in burner load do not require the O_2 trim controller to interfere.** Consideration is given to a number of measured values that are ascertained when the burner is set. This means that the controller only becomes active when environmental conditions (temperature, pressure) change, and not when the burner load changes.

WARNING

The installation and setting of the system must be carried out by qualified personnel, as indicated in the specific documentation of the device.

7 Maintenance

7.1 Notes on safety for the maintenance

The periodic maintenance is essential for the good operation, safety, yield and duration of the burner.
It allows you to reduce consumption and polluting emissions and to keep the product in a reliable state over time.

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

Before carrying out any maintenance, cleaning or checking operations:

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

Turn off the fuel interception tap.

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

7.2 Maintenance programme

7.2.1 Maintenance frequency

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

7.2.2 Safety test - with gas feeding closed

For its safe commissioning it is very important to make sure that the electrical wiring has been carried out correctly between the gas valves and the burner.

To this end, after checking that the connections have been made in conformity with the burner's wiring diagram, a starting cycle should be carried out with the gas tap closed (dry test).

1 The manual gas valve should be closed with the locking/releasing device (“lock-out / tag out” procedure).
2 Make sure the limit electric contacts of the burner close
3 Make sure the contact of the minimum gas pressure switch closes
4 Proceed with a tentative start up of the burner.

The starting cycle should occur with the following phases:

– Starting the fan motor for pre-purging
– Carrying out the gas valve leak detection control, if applicable
– Completing the pre-purging
– Reaching the ignition point
– Power supply of the ignition transformer
– Power supply the gas valves.

Since the gas is closed, the burner will not be able to start and its control box will stop or go into a safety lockout.

The effective supplying of the gas valves can be checked with the insertion of a tester; some valves are fitted with light signals (or closure/opening position indicators) that are activated when the electrical supply arrives.

IF THE ELECTRICAL SUPPLY OF THE GAS VALVES OCCURS AT AN UNEXPECTED MOMENT, DO NOT OPEN THE MANUAL VALVE, DISCONNECT THE ELECTRICAL SUPPLY, CHECK THE WIRING; CORRECT THE ERRORS AND CARRY OUT THE ENTIRE TEST AGAIN.

7.2.3 Checking and cleaning

The operator must use the required equipment during maintenance.

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

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

Burner
Check that there are not excess wear or loosen screws.
Clean the outside of the burner.

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

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

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

Gas filter
Change the gas filter when it is dirty.

Combustion
If the combustion values measured before starting maintenance do not comply with applicable legislation or do not indicate efficient combustion, consult the 7.2.4 or contact our Technical Support Service to implement the necessary adjustments.
It is advisable to set the burner according to the type of gas used and following the indications in 7.2.4.

EN 676		Air excess			
		Max. output $\lambda \leq 1.2$		Min. output $\lambda \leq 1.3$	
GAS	CO_2 theoretic aλ max. 0% O_2	CO_2 % Calibration		CO	NO_X
		$\lambda = 1.2$	$\lambda = 1.3$	mg/kWh	mg/kWh
G 20	11.7	9.7	9.0	≤ 100	≤ 170
G 25	11.5	9.5	8.8	≤ 100	≤ 170
G 30	14.0	11.6	10.7	≤ 100	≤ 230
G 31	13.7	11.4	10.5	≤ 100	≤ 230

Tab. P

7.2.4 Safety components
The safety components should be replaced at the end of their life cycle indicated in the following table.
The specified life cycles do not refer to the warranty terms indicated in the delivery or payment conditions.

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

Tab. Q

7.2.5 Measuring the ionisation current
The burner is fitted with an ionisation system to check that a flame is present.
The burner provides a much higher current, so controls are not normally required.
However, if it is necessary to measure the ionisation current, disconnect the plug-socket on the ionisation probe cable and insert a direct current microammeter with a base scale of 100 µA, as shown in Fig. 34.

Carefully check the polarities!

WARNING

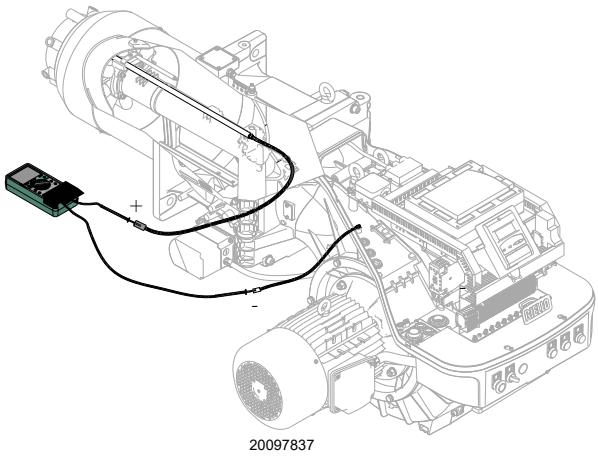


Fig. 34

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

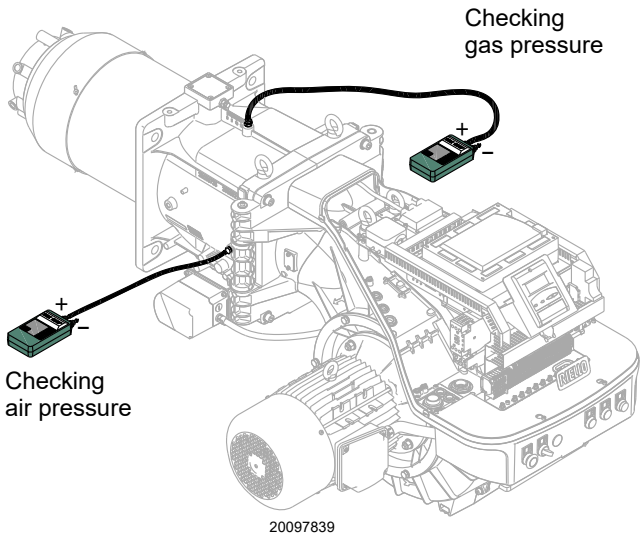


Fig. 35

7.3 Opening the burner

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

Turn off the fuel interception tap.

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

To open the burner, use the same procedure set out in “Access to head internal part” on pag. 24.

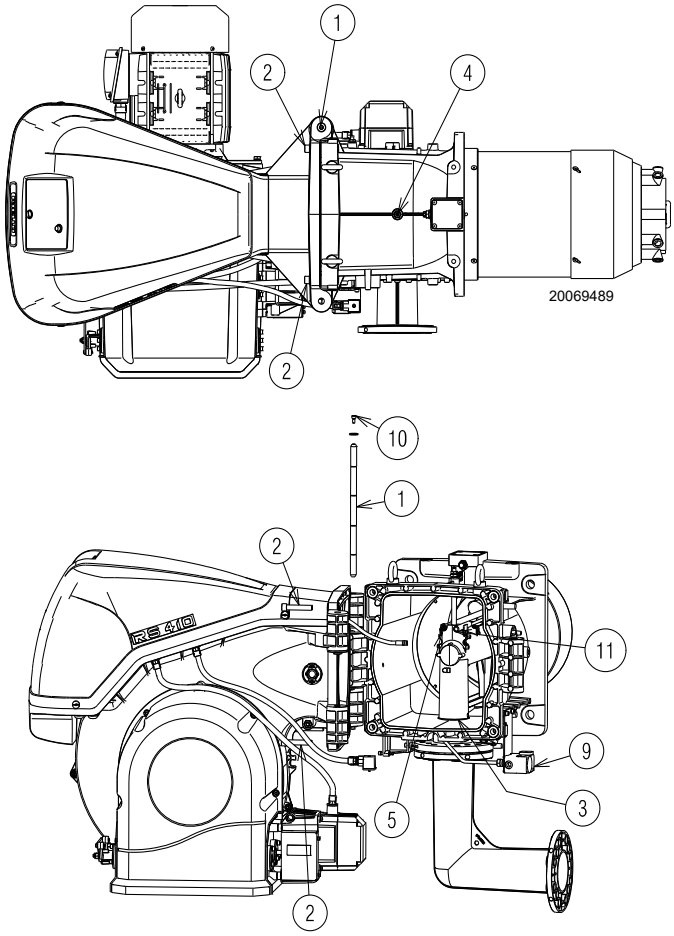


Fig. 36

7.4 Closing the burner

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

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

8 Faults - Possible causes - Solutions

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

WARNING

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

DANGER

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

A Appendix - Accessories

Kit for modulating operation

Burner	Probe	Adjustment field	Code
All models	PT 100 temperature	- 100...+ 500°C	3010110
All models	4 - 20 mA pressure	0...2.5 bar	3010213
All models	4 - 20 mA pressure	0...16 bar	3010214
All models	4 - 20 mA pressure	0...25 bar	3090873

QRI photocell kit

Burner	Code
All models	On demand

Soundproofing box kit

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

Continuous purging kit

Burner	Code
All models	3010094

Software interface kit (ACS450)

Burner	Code
All models	3010388

Infrared flame detector

Burner	Code
All models	On demand

Efficiency kit with oxygen control kit

Burner	Code
All models	3010377

Oxygen control kit

Burner	Code
All models	20045187

Kit for additional transformer

Burner	Code
All models	20044177

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

Burner	Ramp type	Code
All models	MB - CB	3010344

Gas trains in compliance with EN 676

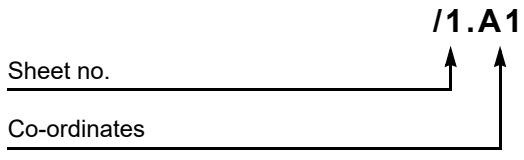
Please refer to manual.

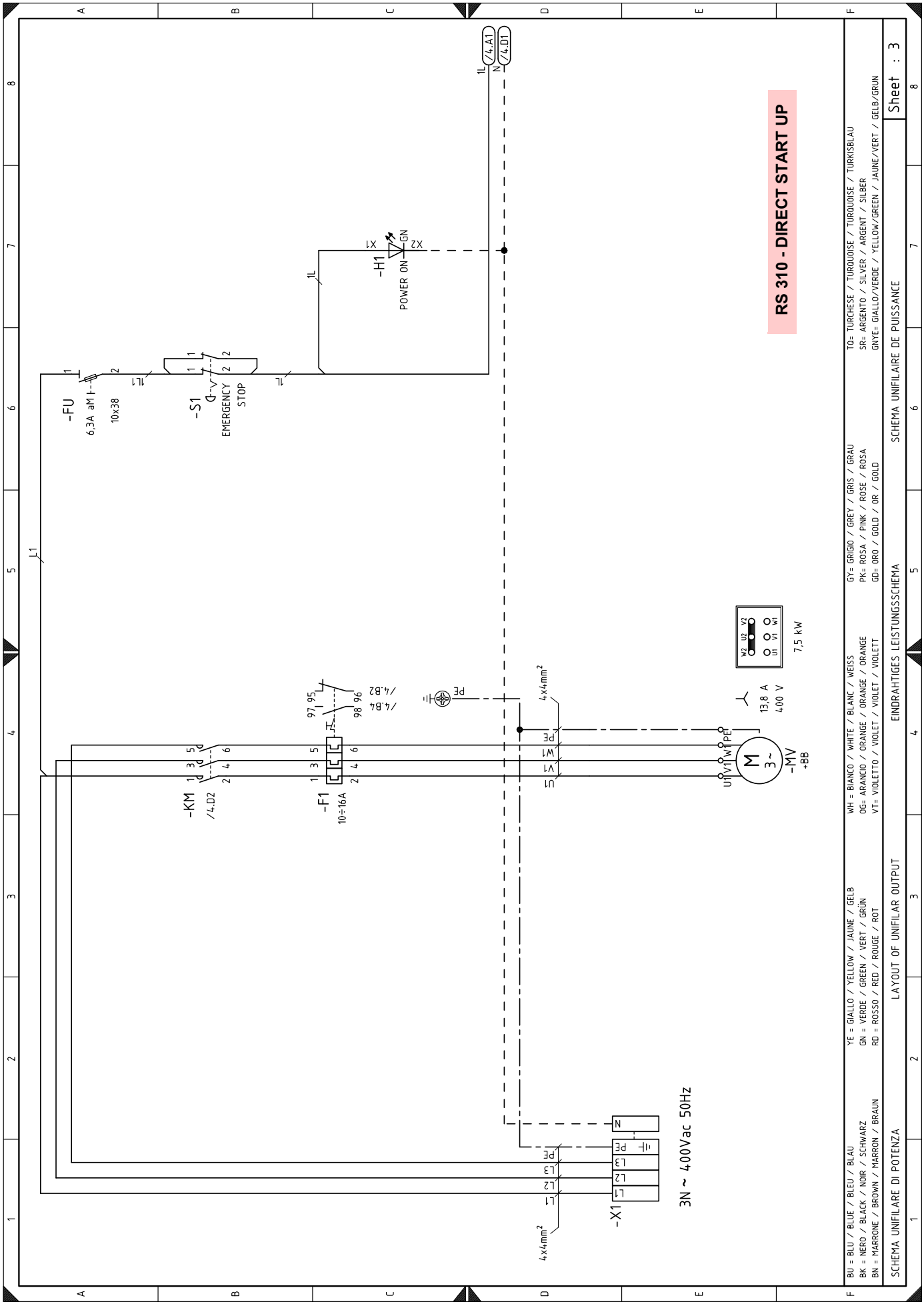
WARNING

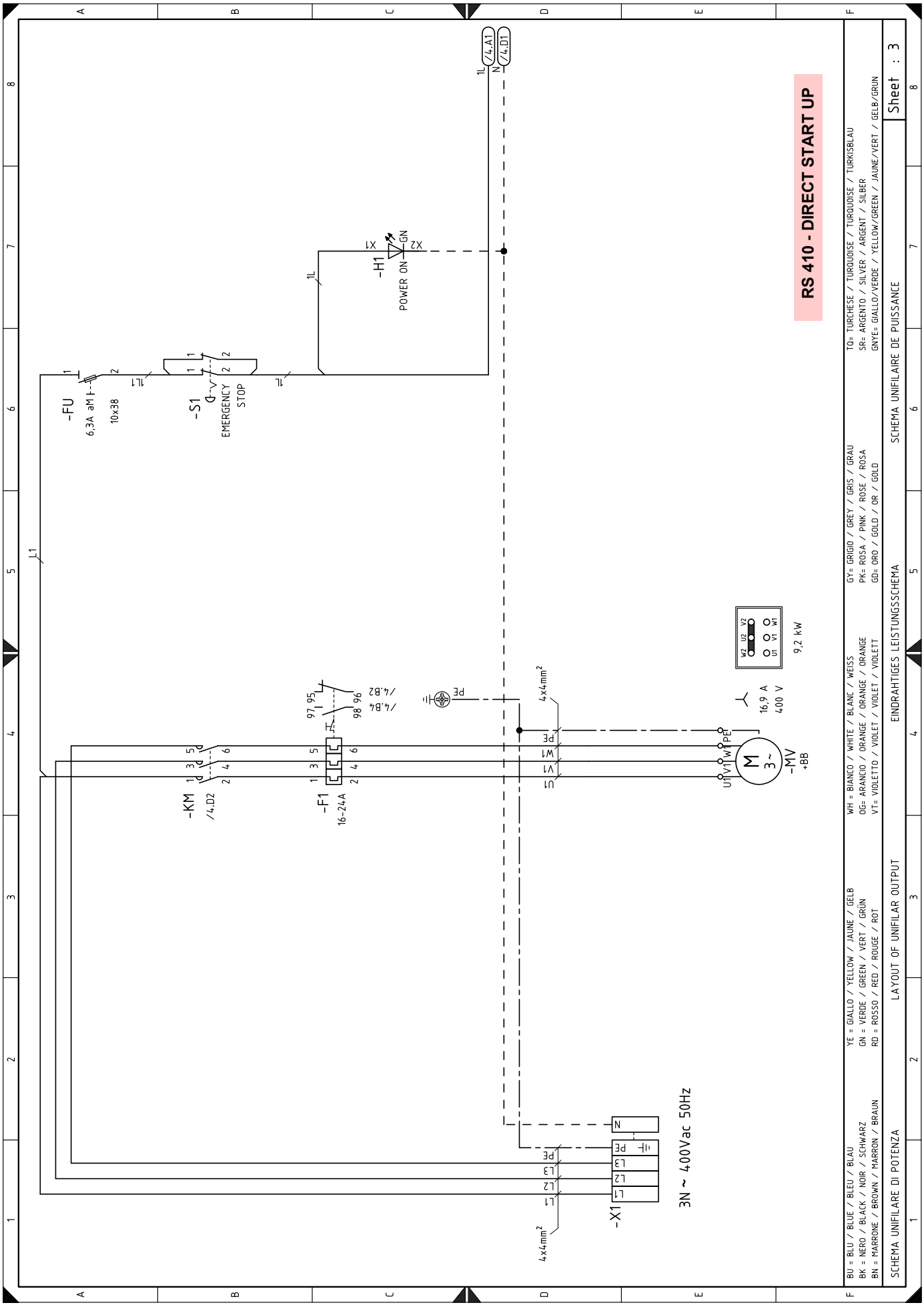
The installer is responsible for the addition of any safety device not foreseen in this manual.

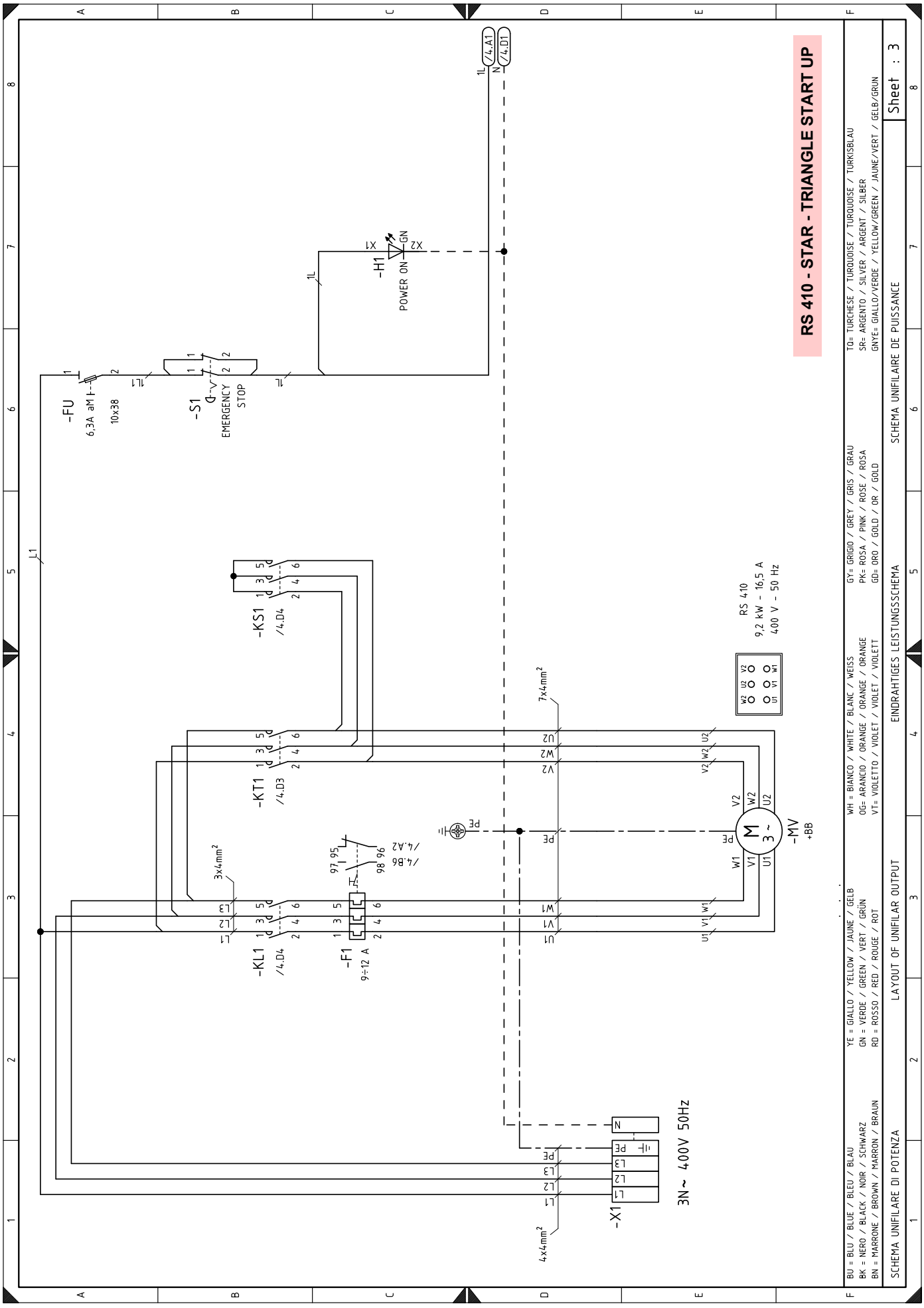
B Appendix - Electrical panel layout

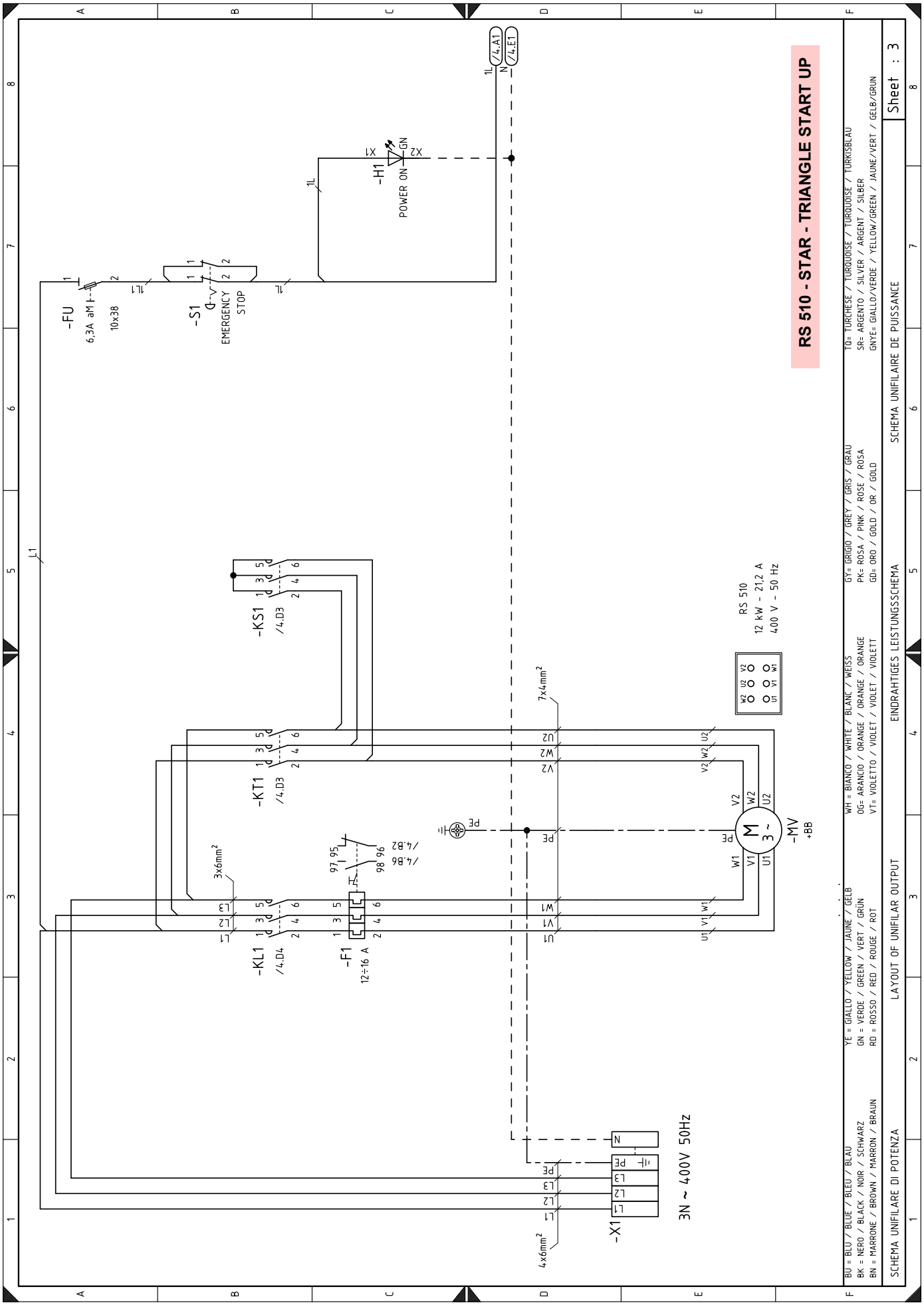
2 Indication of references

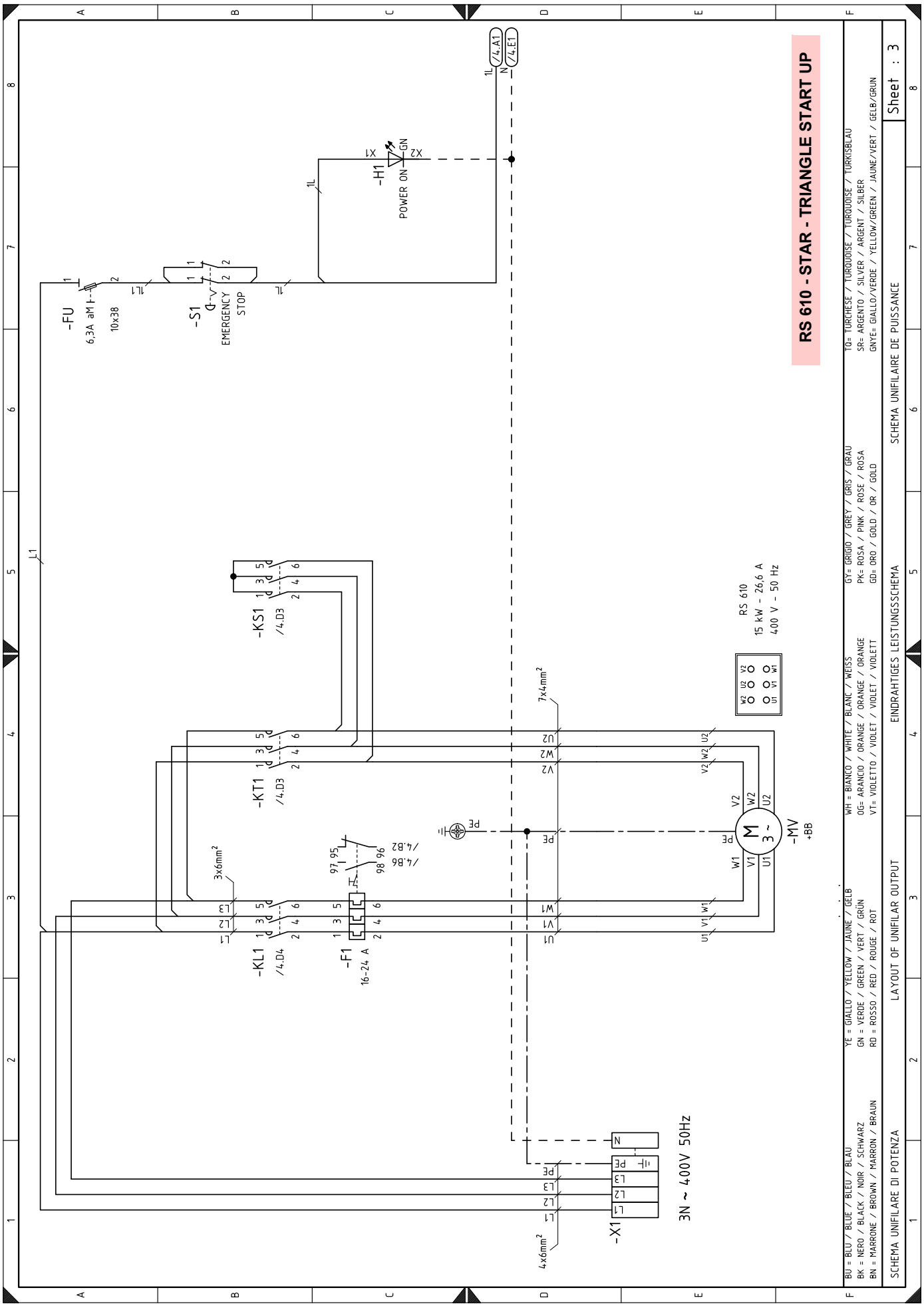


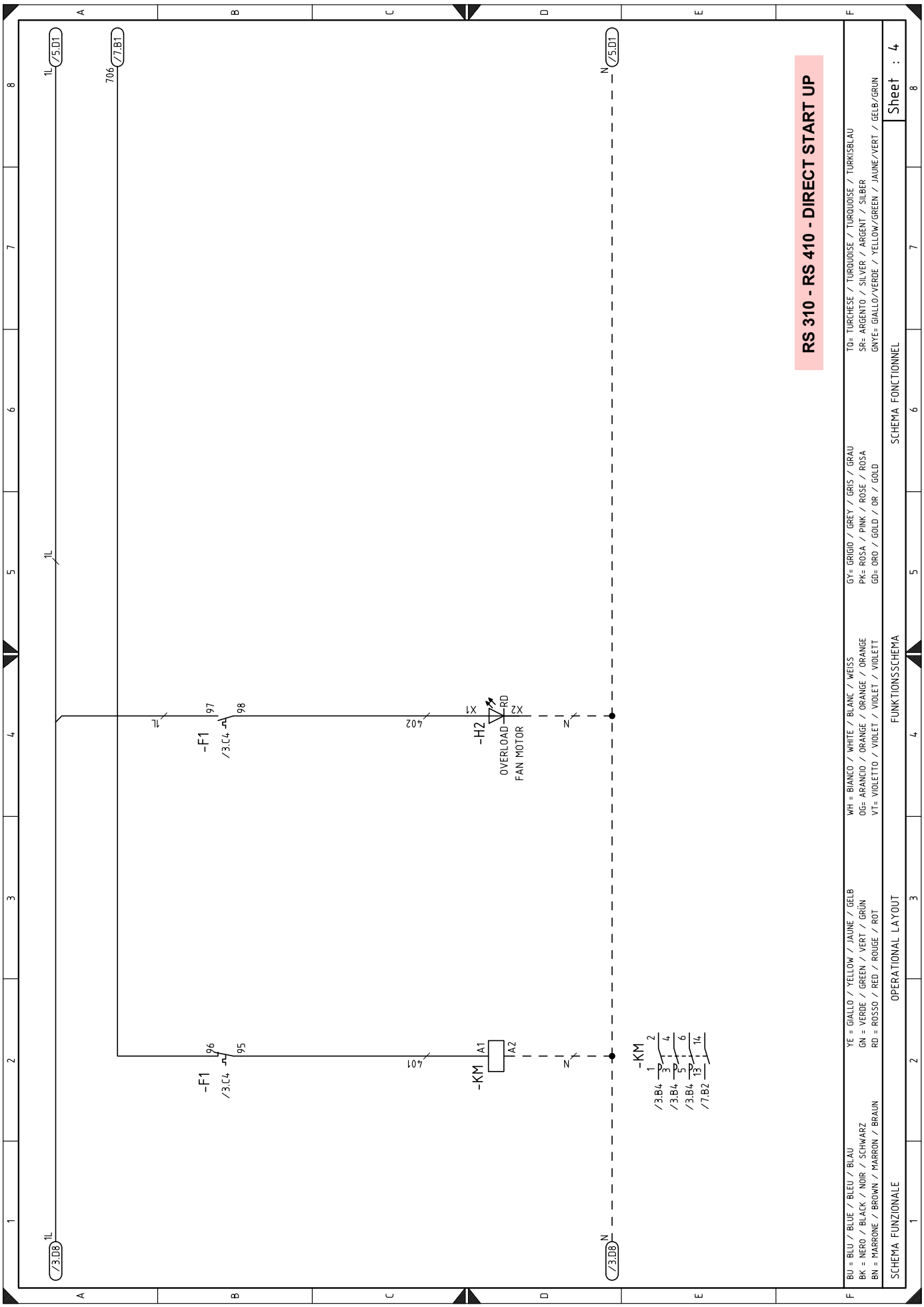

RS 310 - DIRECT START UP
SCHEMA UNIFILARE DI POTENZA
LAYOUT OF UNIFILAR OUTPUT
EINDRAHTIGES LEISTUNGSSCHEMA
SCHEMA UNIFILAIRE DE PUISSANCE
Sheet : 3
-FU
6,3A aM
10x38
-S1
EMERGENCY
STOP
-H1
POWER ON
-KM
/4.D2
-F1
10÷16A
-X1
-MV
+BB
7,5 kW
13,8 A
400 V
3N ~ 400Vac 50Hz
4x4mm²
BU = BLU / BLUE / BLEU / 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

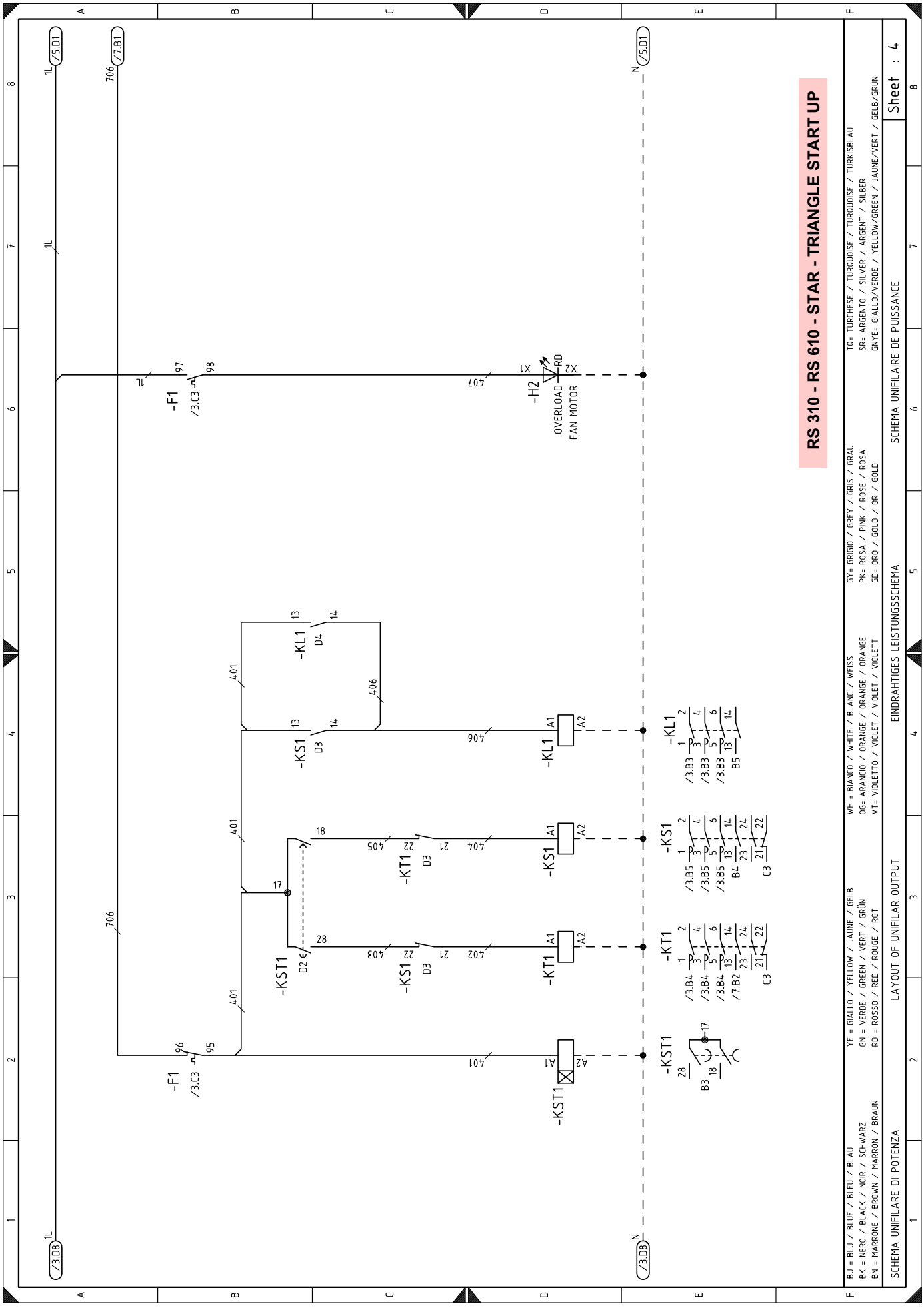

RS 410 - DIRECT START UP
SCHEMA UNIFILARE DI POTENZA
LAYOUT OF UNIFILAR OUTPUT
EINDRAHTIGES LEISTUNGSSCHEMA
SCHEMA UNIFILAIRE DE PUISSANCE
Sheet : 3
-FU
6,3A aM
10x38
-S1
EMERGENCY STOP
-H1
POWER ON
-KM
-F1
16-24A
-MV
9,2 kW
16,9 A
400 V
-X1
3N ~ 400Vac 50Hz
4x4mm²
BU = BLU / BLUE / BLEU / BLAU
BK = 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

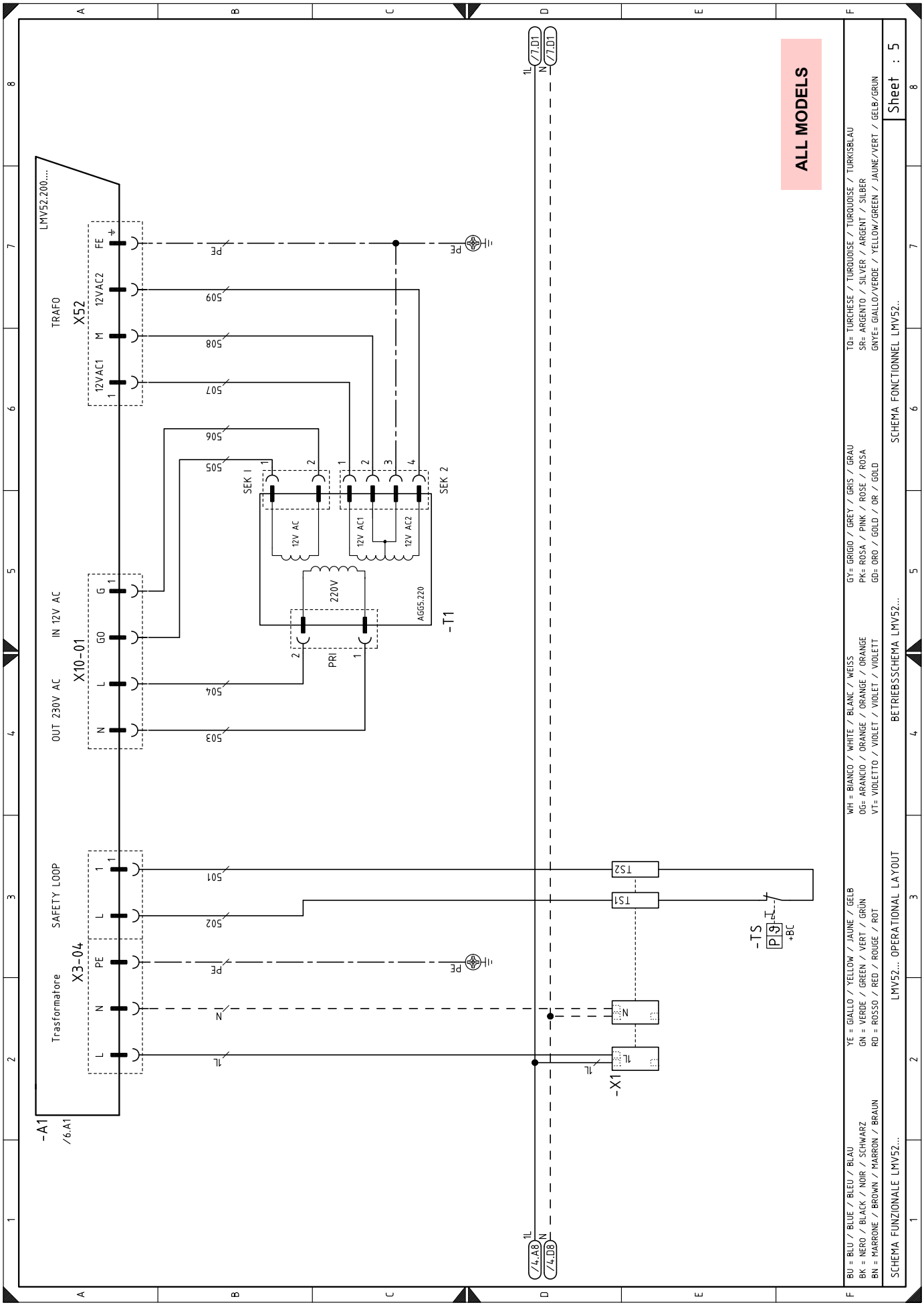

RS 410 - STAR - TRIANGLE START UP
SCHEMA UNIFILARE DI POTENZA
LAYOUT OF UNIFILAR OUTPUT
EINDRAHTIGES LEISTUNGSSCHEMA
SCHEMA UNIFILAIRE DE PUISSANCE
Sheet : 3
-FU
6,3A aM
10x38
-S1
EMERGENCY STOP
-H1
POWER ON
-KS1
-KT1
-KL1
-F1
9÷12 A
-M1V
+BB
RS 410
9,2 kW - 16,5 A
400 V - 50 Hz
-X1
3N~ 400V 50Hz
BU = BLU / BLEU / BLAU
BK = NERO / BLACK / NOIR / SCHWARZ
BN = MARRONE / BROWN / MARRON / BRAUN
YE = GIALLO / YELLOW / JAUNE / GELB
GN = VERDE / GREEN / VERT / GRUN
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

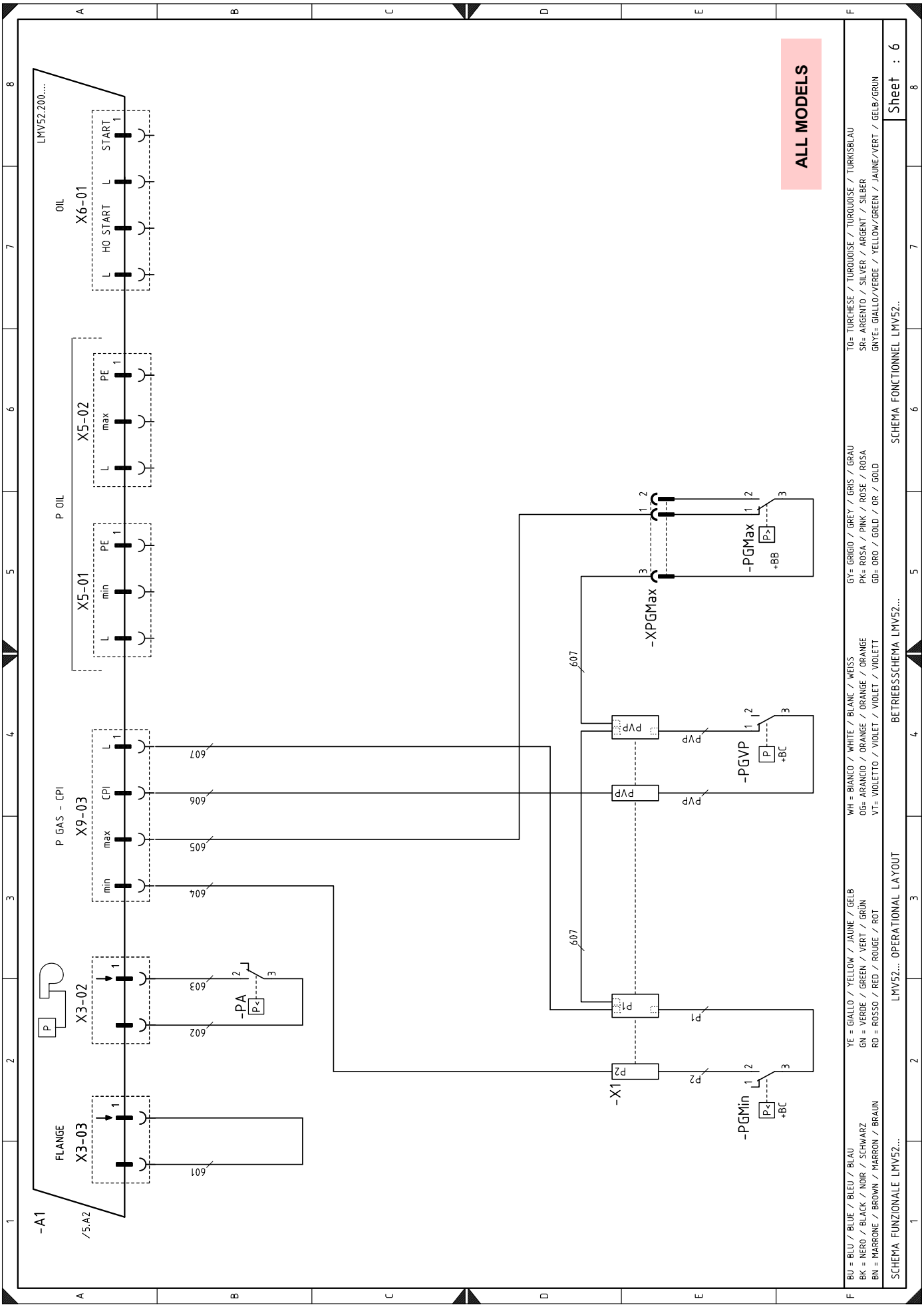

RS 510 - STAR - TRIANGLE START UP
-FU
6,3A aM
10x38
-S1
EMERGENCY STOP
-H1
POWER ON
-KS1
-KT1
-KL1
-F1
12÷16 A
-M1V
+BB
RS 510
12 kW - 21,2 A
400 V - 50 Hz
-X1
3N ~ 400V 50Hz
SCHEMA UNIFILARE DI POTENZA
LAYOUT OF UNIFILAR OUTPUT
EINDRAHTIGES LEISTUNGSSCHEMA
SCHEMA UNIFILAIRE DE PUISSANCE
Sheet : 3

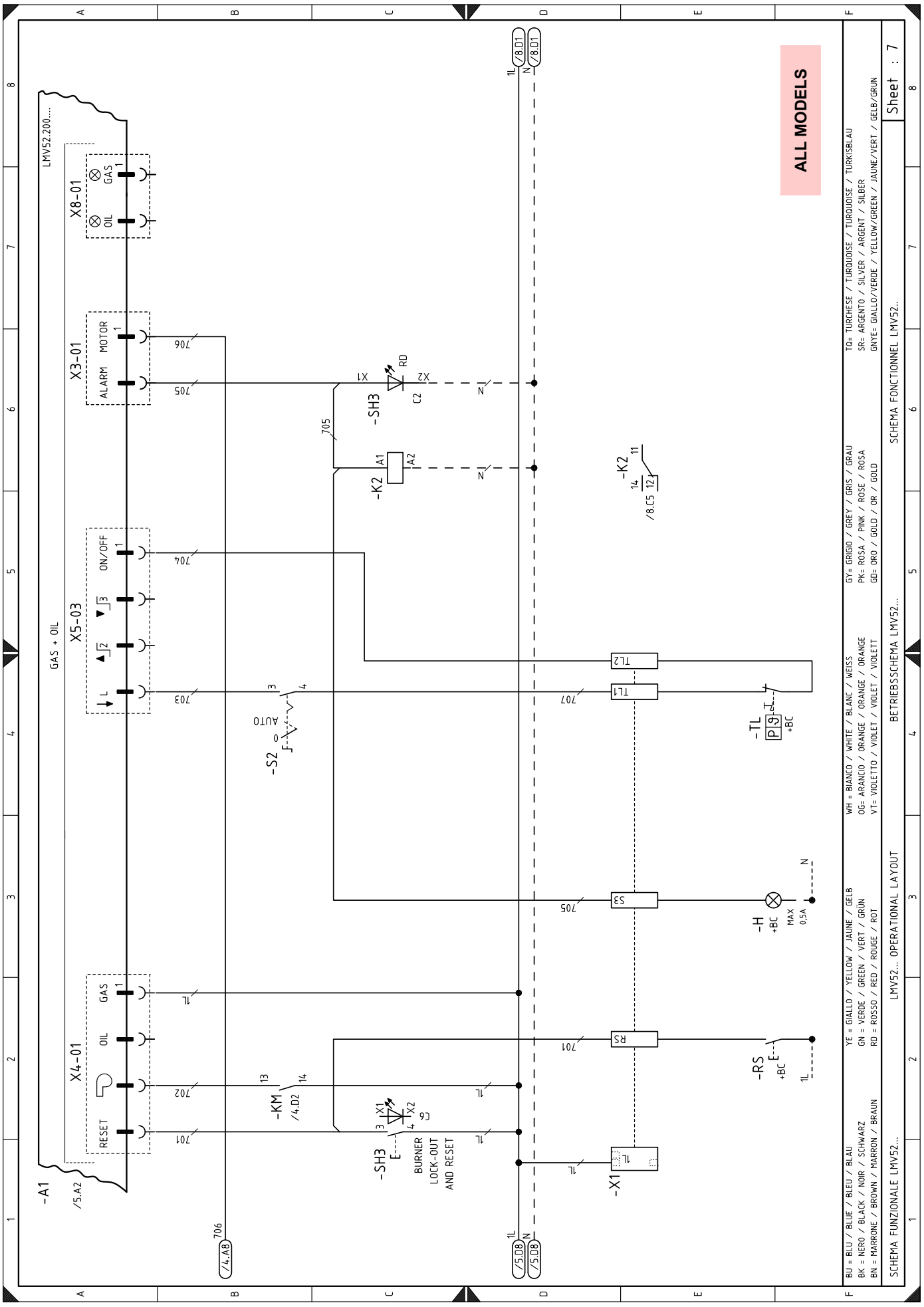

RS 610 - STAR - TRIANGLE START UP
SCHEMA UNIFILARE DI POTENZA
LAYOUT OF UNIFILAR OUTPUT
EINDRAHTIGES LEISTUNGSSCHEMA
SCHEMA UNIFILAIRE DE PUISSANCE
Sheet : 3
RS 610
15 kW - 26.6 A
400 V - 50 Hz
3N ~ 400V 50Hz
-FU
6,3A aM
10x38
-S1
EMERGENCY STOP
-H1
POWER ON
-KS1
-KT1
-KL1
-F1
16-24 A
-MV
+BB
-X1
3x6mm²
7x4mm²
4x6mm²
BU = BLU / BLEU / BLAU
BK = NERO / BLACK / NOIR / SCHWARZ
BN = MARRONE / BROWN / MARRON / BRAUN
YE = GIALLO / YELLOW / JAUNE / GELB
GN = VERDE / GREEN / VERT / GRUN
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
GO= ORO / GOLD / OR / GOLD
TQ= TURCHESE / TURQUOISE / TURQUOISE / TURKISBLAU
SR= ARGENTO / SILVER / ARGENT / SILBER
GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN

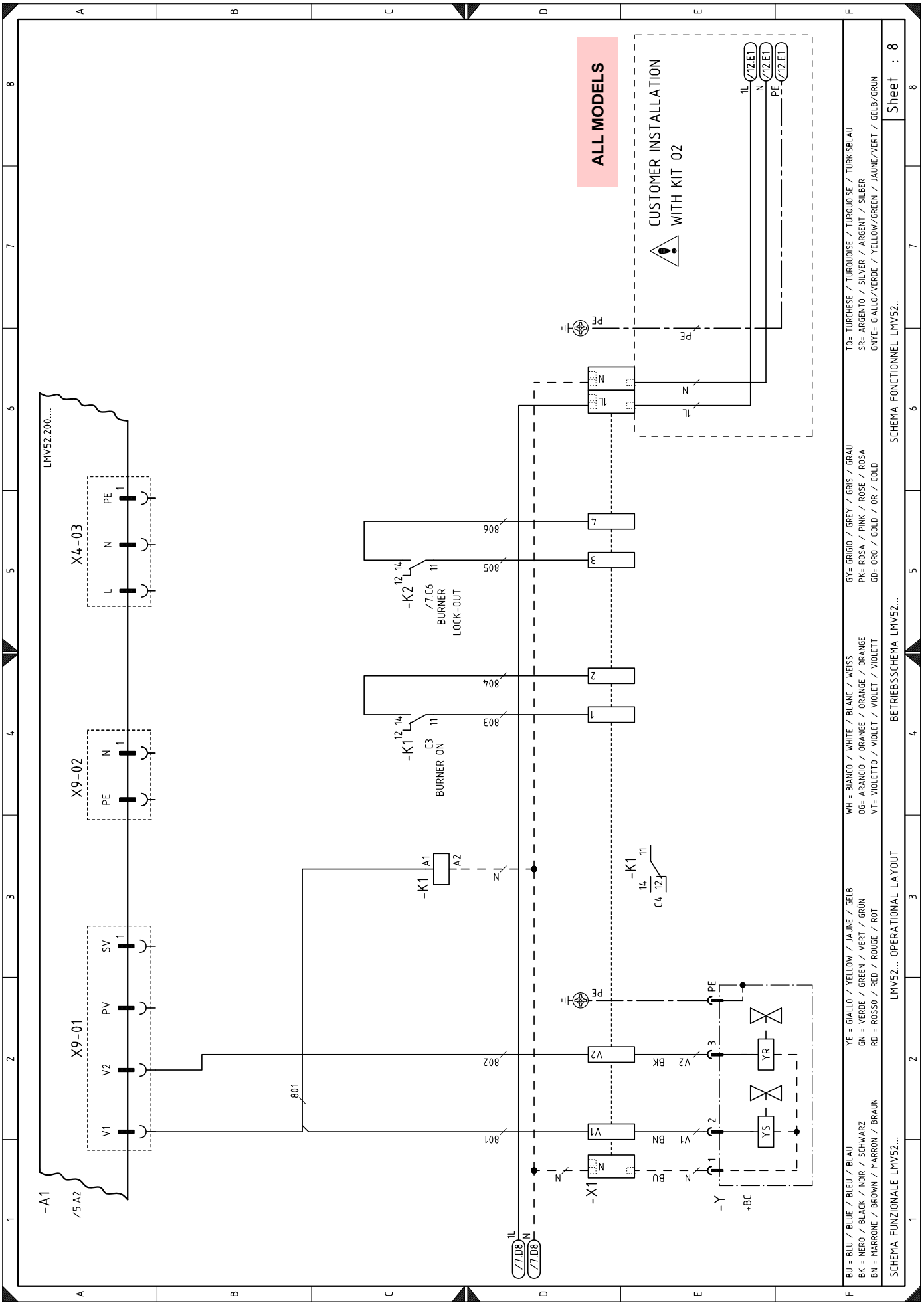

RS 310 - RS 410 - DIRECT START UP
SCHEMA FUNZIONALE
OPERATIONAL LAYOUT
FUNKTIONSSCHEMA
SCHEMA FONCTIONNEL
Sheet : 4
-F1
-H2
-KM
OVERLOAD
FAN MOTOR
BU = BLU / BLUE / BLEU / BLAU
BK = NERO / BLACK / NOIR / SCHWARZ
BN = MARRONE / BROWN / MARRON / BRAUN
YE = GIALLO / YELLOW / JAUNE / GELB
GN = VERDE / GREEN / 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
GO= ORO / GOLD / OR / GOLD
TQ= TURCHESE / TURQUOISE / TURQUOISE / TURKISBLAU
SR= ARGENTO / SILVER / ARGENT / SILBER
GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN

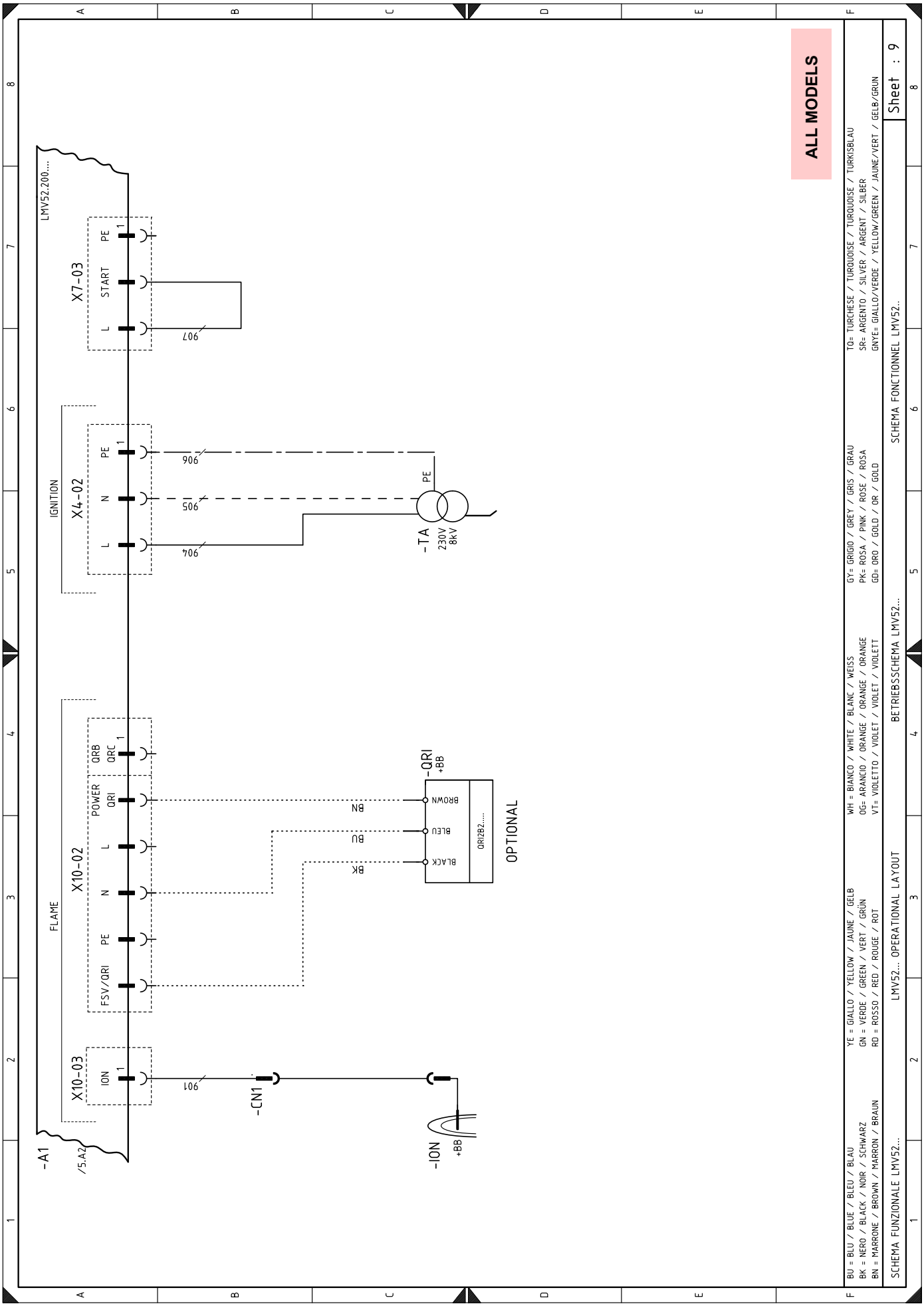

RS 310 - RS 610 - STAR - TRIANGLE START UP
SCHEMA UNIFILARE DI POTENZA
LAYOUT OF UNIFILAR OUTPUT
EINDRAHTIGES LEISTUNGSSCHEMA
SCHEMA UNIFILAIRE DE PUISSANCE
Sheet : 4
-F1
-H2
OVERLOAD
FAN MOTOR
-KL1
-KS1
-KT1
-KST1
BU = BLU / BLUE / BLEU / BLAU
BK = NERO / BLACK / NOIR / SCHWARZ
BN = MARRONE / BROWN / 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

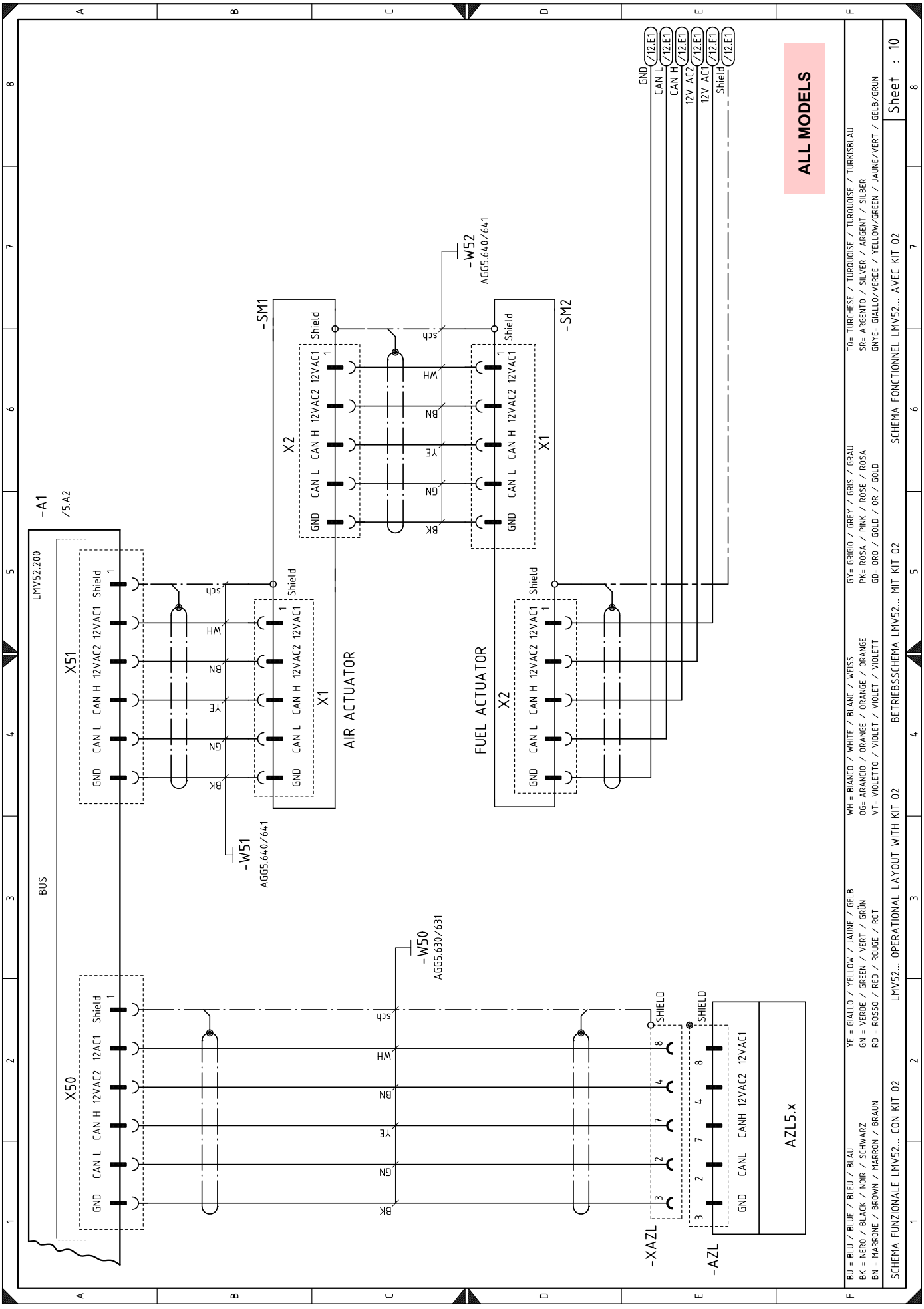

ALL MODELS
LMV52.200....
TRAFO
X52
FE
12VAC2
M
12VAC1
SEK 1
SEK 2
12V AC
12V AC1
12V AC2
220V
AG65.220
-T1
PRI
IN 12V AC
OUT 230V AC
X10-01
G
G0
L
N
SAFETY LOOP
Trasformatore
X3-04
PE
-A1
/6.A1
-X1
-TS
P19
+BC
TS1
TS2
/7.D1
/4.A8
/4.D8
SCHEMA FUNZIONALE LMV52...
LMV52... OPERATIONAL LAYOUT
BETRIEBSSCHEMA LMV52...
SCHEMA FONCTIONNEL LMV52..
Sheet : 5
BU = BLU / BLUE / BLEU / BLAU
BK = NERO / BLACK / NOIR / SCHWARZ
BN = MARRONE / BROWN / MARRON / BRAUN
YE = GIALLO / YELLOW / JAUNE / GELB
GN = VERDE / GREEN / VERT / GRÜN
RD = ROSSO / RED / ROUGE / ROT
WH = BIANCO / WHITE / BLANC / WEISS
OG= ARANCIO / ORANGE / ORANGE / ORANGE
VT= VIOLETTO / VIOLET / VIOLET / VIOLETT
GY= GRIGIO / GREY / GRIS / GRAU
PK= ROSA / PINK / ROSE / ROSA
GO= ORO / GOLD / OR / GOLD
TO= TURCHESE / TURQUOISE / TURQUOISE / TURKISBLAU
SR= ARGENTO / SILVER / ARGENT / SILBER
GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN

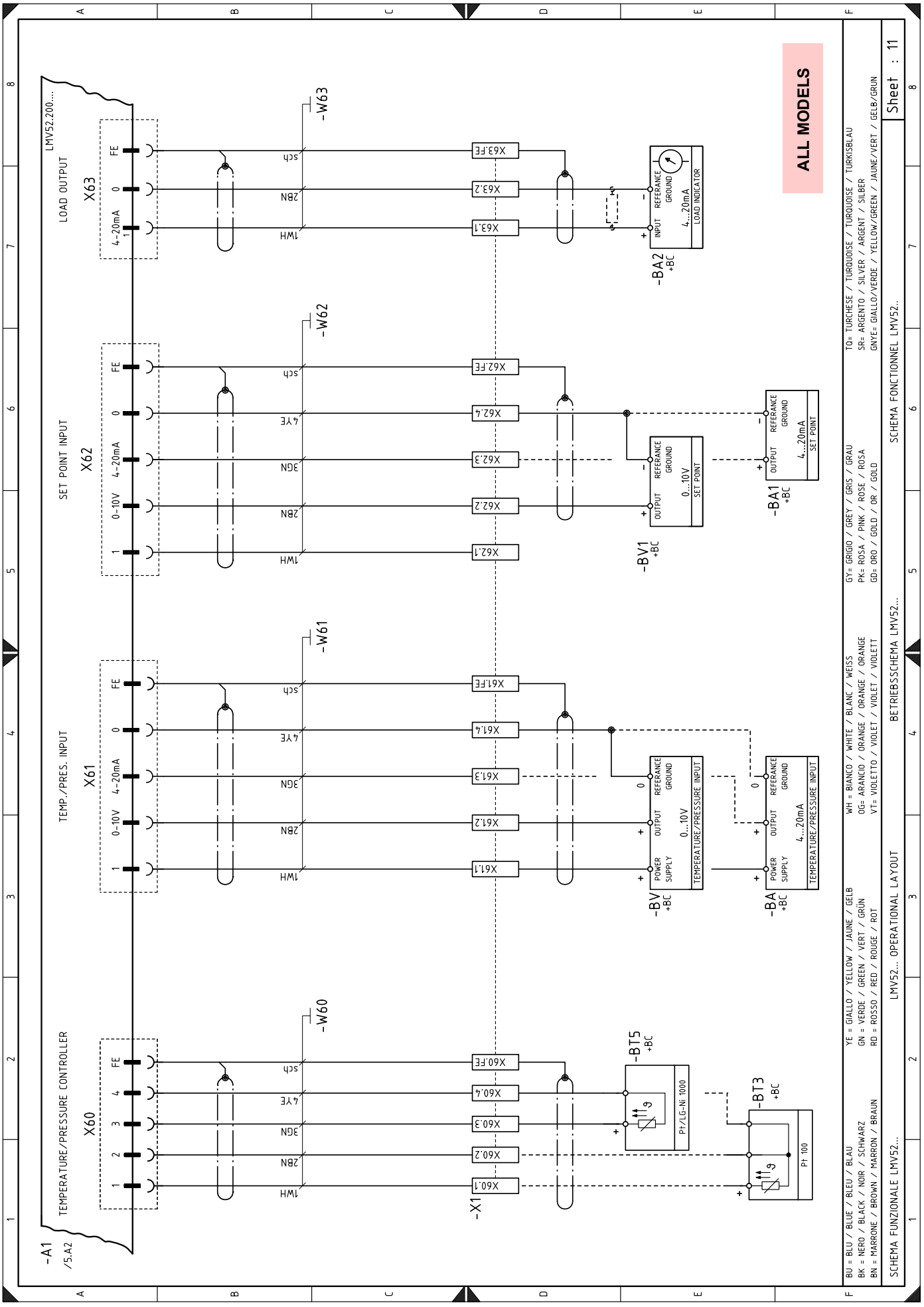

ALL MODELS
LMV52.200...
OIL
X6-01
HO START
START
P OIL
X5-02
X5-01
P GAS - CPI
X9-03
X3-02
FLANGE
X3-03
-A1
/5.A2
-PA
-PGMax
-XPGMax
-PGVP
-PGMin
-X1
SCHEMA FUNZIONALE LMV52...
LMV52... OPERATIONAL LAYOUT
BETRIEBSSCHEMA LMV52...
SCHEMA FONCTIONNEL LMV52...
Sheet : 6


ALL MODELS
LMV52.200....
GAS + OIL
X8-01
X3-01
X5-03
X4-01
-A1
-SH3
-K2
-S2
-KM
-TL
-RS
-H
-X1
BURNER
LOCK-OUT
AND RESET
SCHEMA FUNZIONALE LMV52...
LMV52... OPERATIONAL LAYOUT
BETRIEBSSCHEMA LMV52...
SCHEMA FONCTIONNEL LMV52...
Sheet : 7


ALL MODELS
CUSTOMER INSTALLATION
WITH KIT 02
LMV52.200....
-A1
/5.A2
X4-03
X9-02
X9-01
-K2
/7.C6
BURNER
LOCK-OUT
-K1
C3
BURNER ON
-K1
C4
-X1
-Y
+BC
/12.E1
/7.D8
806
805
804
803
802
801
BU = BLU / 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 LMV52... LMV52... OPERATIONAL LAYOUT BETRIEBSSCHEMA LMV52... SCHEMA FONCTIONNEL LMV52...
Sheet : 8


ALL MODELS
LMV52.200....
X7-03
START
907
X4-02
IGNITION
906
905
904
-TA
230V
8KV
PE
X10-02
FLAME
POWER
QRI
QRB
QRC
FSV/QRI
PE
N
L
X10-03
ION
901
-CN1
-ION
+BB
-QRI
+BB
BROWN
BLEU
BLACK
QRI2B2....
BN
BU
BK
OPTIONAL
-A1
/5.A2
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 LMV52...
LMV52... OPERATIONAL LAYOUT
BETRIEBSSCHEMA LMV52...
SCHEMA FONCTIONNEL LMV52..
Sheet : 9


ALL MODELS
-A1
/5.A2
LMV52.200
BUS
X50
X51
-SM1
-SM2
X2
X1
AIR ACTUATOR
FUEL ACTUATOR
-W50
AGG5.630/631
-W51
AGG5.640/641
-W52
AGG5.640/641
-XAZL
-AZL
AZL5.x
GND
CAN L
CAN H
12VAC2
12VAC1
Shield
SHIELD
CANL
CANH
BK
GN
YE
BN
WH
/12.E1
12V AC1
12V AC2
SCHEMA FUNZIONALE LMV52... CON KIT 02
LMV52... OPERATIONAL LAYOUT WITH KIT 02
BETRIEBSSCHEMA LMV52... MIT KIT 02
SCHEMA FONCTIONNEL LMV52... AVEC KIT 02
Sheet : 10
BU = BLU / 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


ALL MODELS
LMV52.200....
LOAD OUTPUT
SET POINT INPUT
TEMP./PRES. INPUT
TEMPERATURE/PRESSURE CONTROLLER
X63
X62
X61
X60
-W63
-W62
-W61
-W60
-A1
/5.A2
-X1
-BA2 +BC
-BV1 +BC
-BA1 +BC
-BV +BC
-BA +BC
-BT5 +BC
-BT3 +BC
LOAD INDICATOR
SET POINT
TEMPERATURE/PRESSURE INPUT
Pt1/LG-Ni 1000
Pt 100
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
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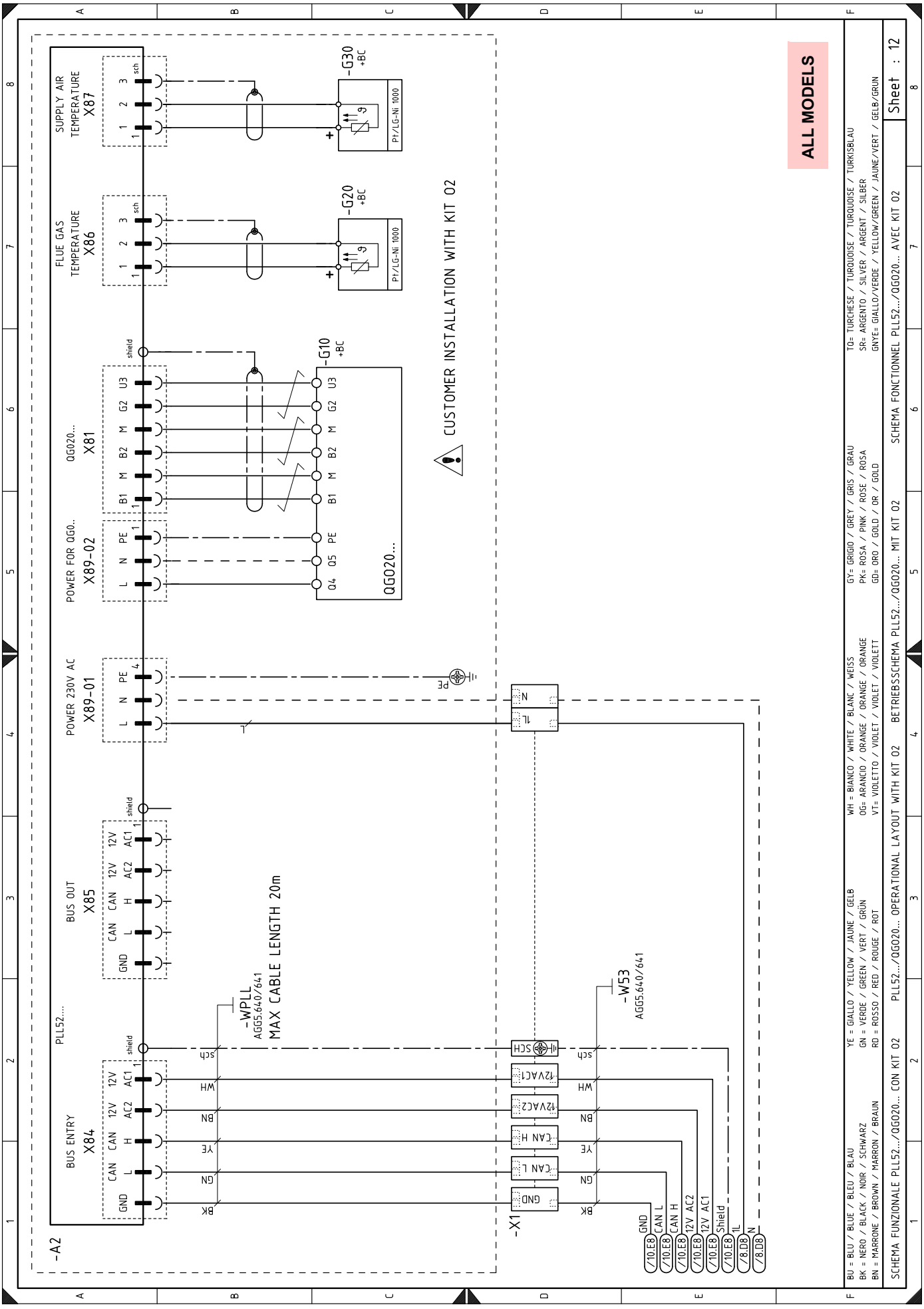
PK= ROSA / PINK / ROSE / ROSA
GD= ORO / GOLD / OR / GOLD
TQ= TURCHESE / TURQUOISE / TURQUOISE / TURKISBLAU
SR= ARGENTO / SILVER / ARGENT / SILBER
GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN
SCHEMA FUNZIONALE LMV52...
LMV52... OPERATIONAL LAYOUT
BETRIEBSSCHEMA LMV52...
SCHEMA FONCTIONNEL LMV52..
Sheet : 11


ALL MODELS
CUSTOMER INSTALLATION WITH KIT 02
SUPPLY AIR TEMPERATURE X87
FLUE GAS TEMPERATURE X86
POWER FOR QG0.. X89-02
QG020... X81
POWER 230V AC X89-01
BUS OUT X85
BUS ENTRY X84
PLL52....
-A2
-G30 +BC
-G20 +BC
-G10 +BC
QG020...
PE
-WPLL AGG5.640/641
MAX CABLE LENGTH 20m
-W53 AGG5.640/641
-X1
SCH
12VAC1
12VAC2
CAN H
CAN L
GND
N
L
Shield
12V AC1
12V AC2
CAN H
CAN L
GND
1L
N
BU = BLU / BLEU / BLAU
BK = NERO / BLACK / NOIR / SCHWARZ
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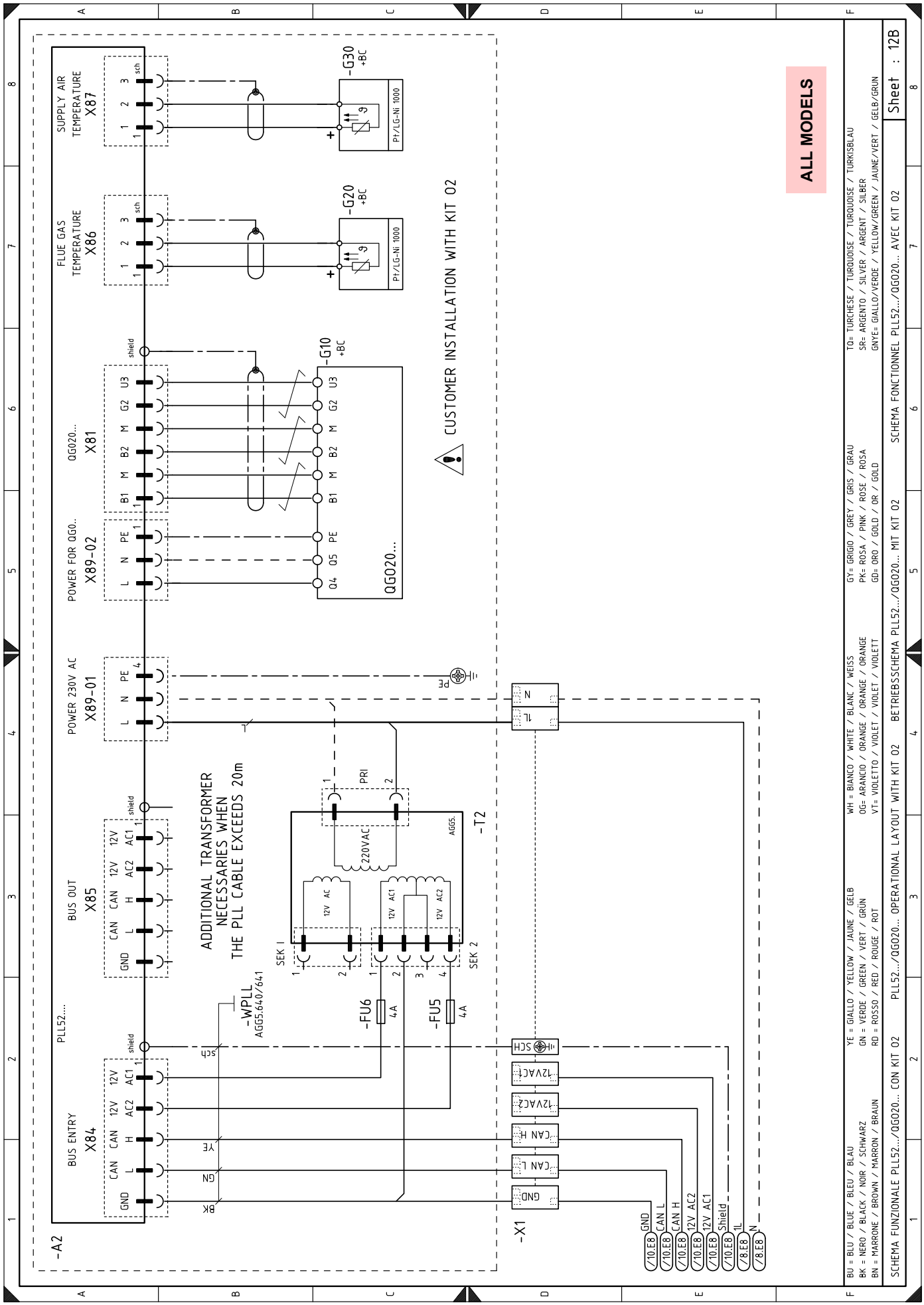
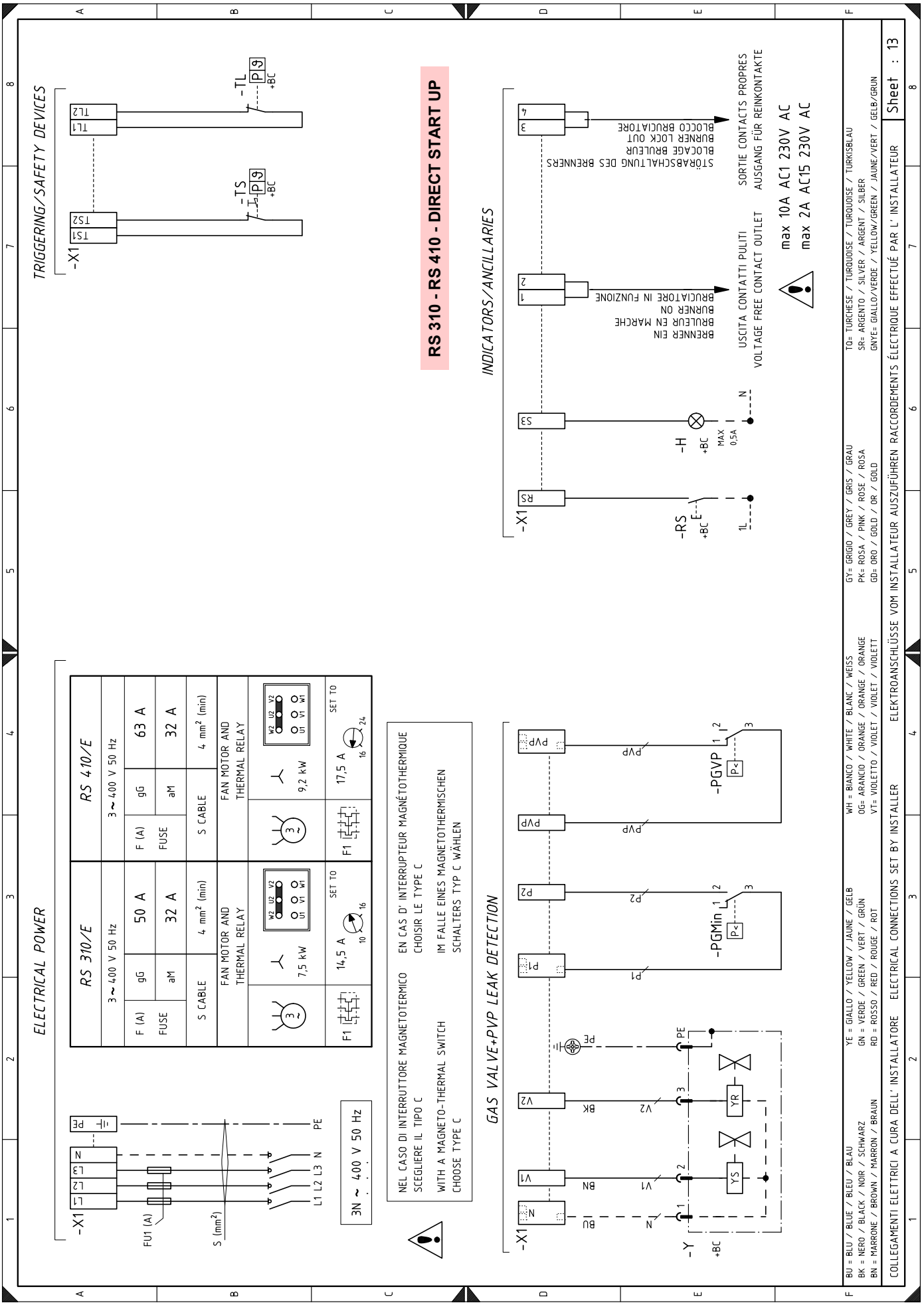
SCHEMA FUNZIONALE PLL52.../QG020... CON KIT 02
PLL52.../QG020... OPERATIONAL LAYOUT WITH KIT 02
BETRIEBSSCHEMA PLL52.../QG020... MIT KIT 02
SCHEMA FONCTIONNEL PLL52.../QG020... AVEC KIT 02
Sheet : 12


ALL MODELS
CUSTOMER INSTALLATION WITH KIT 02
ADDITIONAL TRANSFORMER
NECESSARIES WHEN
THE PLL CABLE EXCEEDS 20m
-A2
-X1
-T2
-WPLL
AGG5.640/641
-FU6
4A
-FU5
4A
-G30
+BC
-G20
+BC
-G10
+BC
QG020...
PLL52....
BUS ENTRY
X84
BUS OUT
X85
POWER 230V AC
X89-01
POWER FOR QG0..
X89-02
QG020...
X81
FLUE GAS
TEMPERATURE
X86
SUPPLY AIR
TEMPERATURE
X87
SCHEMA FUNZIONALE PLL52.../QG020... CON KIT 02
PLL52.../QG020... OPERATIONAL LAYOUT WITH KIT 02
BETRIEBSSCHEMA PLL52.../QG020... MIT KIT 02
SCHEMA FONCTIONNEL PLL52.../QG020... AVEC KIT 02
Sheet : 12B


TRIGGERING/SAFETY DEVICES
-X1
TS1
TS2
-TS
+BC
TL1
TL2
-TL
+BC
RS 310 - RS 410 - DIRECT START UP
INDICATORS/ANCILLARIES
-X1
RS
-RS
+BC
1L
-H
+BC
MAX 0,5A
N
BRENNER EIN
BRULEUR EN MARCHE
BURNER ON
BRUCIATORE IN FUNZIONE
USCITA CONTATTI PULITI
VOLTAGE FREE CONTACT OUTLET
SORTIE CONTACTS PROPRES
AUSGANG FÜR REINKONTAKTE
STÖRABSCHALTUNG DES BRENNERS
BLOCAGE BRULEUR
BURNER LOCK OUT
BLOCCO BRUCIATORE
max 10A AC1 230V AC
max 2A AC15 230V AC
ELECTRICAL POWER
RS 310/E
3 ~ 400 V 50 Hz
F (A) FUSE gG aM
50 A 32 A
S CABLE 4 mm² (min)
FAN MOTOR AND THERMAL RELAY
7,5 kW
14,5 A
SET TO
F1
RS 410/E
3 ~ 400 V 50 Hz
63 A 32 A
9,2 kW
17,5 A
-X1
L1 L2 L3 N PE
FU1 (A)
S (mm²)
3N ~ 400 V 50 Hz
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
GAS VALVE+PVP LEAK DETECTION
-X1
-Y
+BC
-PGMin
-PGVP
PVP
P1
P2
YS
YR
V1
V2
BU
BN
BK
PE
BU = BLU / BLEU / BLAU
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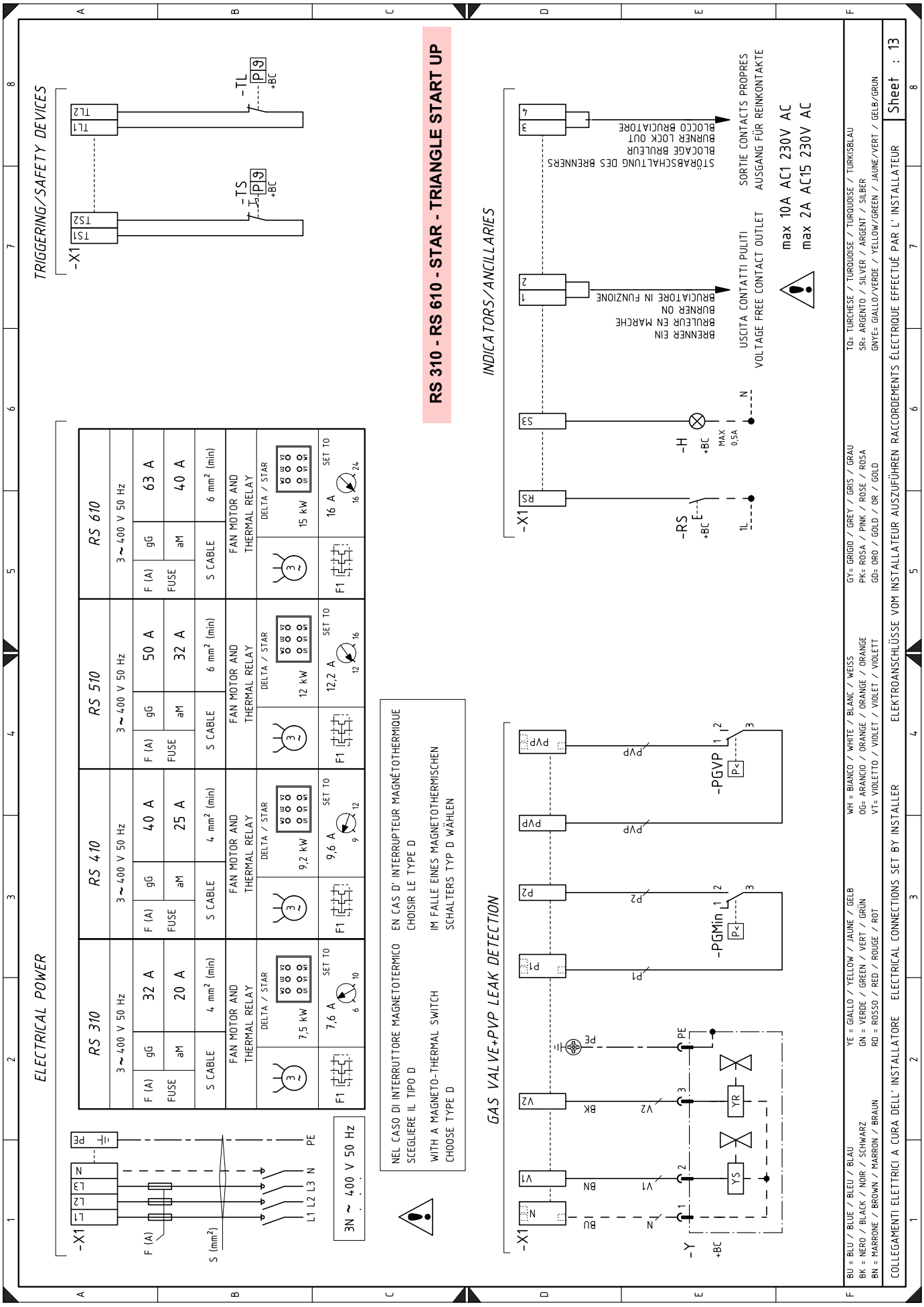
GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRÜN
COLLEGAMENTI ELETTRICI A CURA DELL' INSTALLATORE ELECTRICAL CONNECTIONS SET BY INSTALLER ELEKTROANSCHLÜSSE VOM INSTALLATEUR AUSZUFÜHREN RACCORDEMENTS ÉLECTRIQUE EFFECTUÉ PAR L' INSTALLATEUR
Sheet : 13


RS 310 - RS 610 - STAR - TRIANGLE START UP
ELECTRICAL POWER
TRIGGERING/SAFETY DEVICES
INDICATORS/ANCILLARIES
GAS VALVE+PVP LEAK DETECTION
RS 310
RS 410
RS 510
RS 610
3 ~ 400 V 50 Hz
FUSE
S CABLE
FAN MOTOR AND THERMAL RELAY
DELTA / STAR
SET TO
3N ~ 400 V 50 Hz
NEL CASO DI INTERRUTTORE MAGNETOTERMICO SCEGLIERE IL TIPO D
WITH A MAGNETO-THERMAL SWITCH CHOOSE TYPE D
EN CAS D' INTERRUPTEUR MAGNÉTOTHERMIQUE CHOISIR LE TYPE D
IM FALLE EINES MAGNETOTHERMISCHEN SCHALTERS TYP D WÄHLEN
USCITA CONTATTI PULITI VOLTAGE FREE CONTACT OUTLET SORTIE CONTACTS PROPRES AUSGANG FÜR REINKONTAKTE
max 10A AC1 230V AC
max 2A AC15 230V AC
BU = BLU / BLUE / BLEU / BLAU
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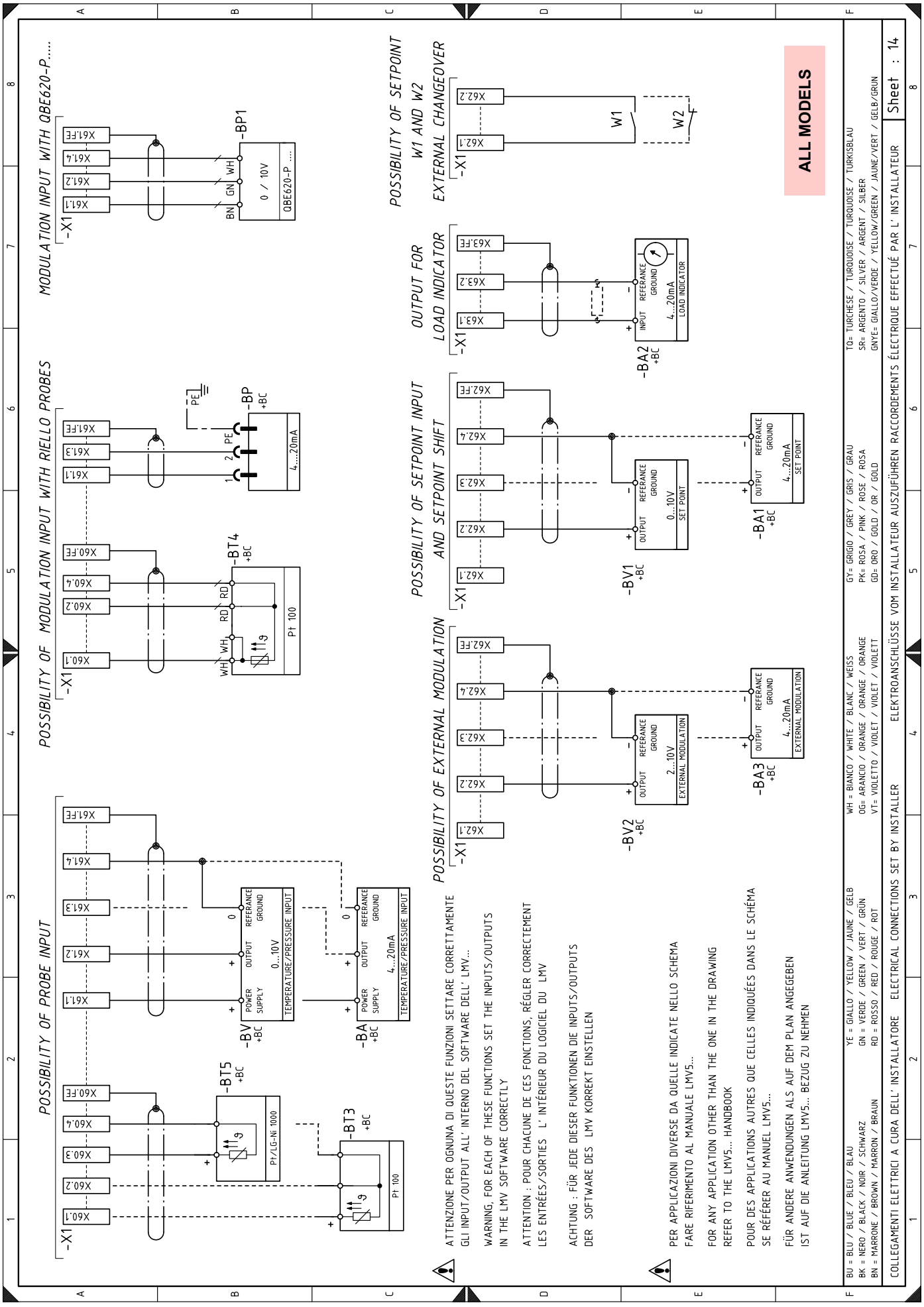
Sheet : 13


MODULATION INPUT WITH QBE620-P.....
POSSIBILITY OF MODULATION INPUT WITH RIELLO PROBES
POSSIBILITY OF PROBE INPUT
POSSIBILITY OF SETPOINT W1 AND W2 EXTERNAL CHANGEOVER
OUTPUT FOR LOAD INDICATOR
POSSIBILITY OF SETPOINT INPUT AND SETPOINT SHIFT
POSSIBILITY OF EXTERNAL MODULATION
ALL MODELS
ATTENZIONE PER OGNUNA DI QUESTE FUNZIONI SETTARE CORRETTAMENTE GLI INPUT/OUTPUT ALL' INTERNO DEL SOFTWARE DELL' LMV...
WARNING, FOR EACH OF THESE FUNCTIONS SET THE INPUTS/OUTPUTS IN THE LMV SOFTWARE CORRECTLY
ATTENTION : POUR CHACUNE DE CES FONCTIONS, RÉGLER CORRECTEMENT LES ENTRÉES/SORTIES L' INTÉRIEUR DU LOGICIEL DU LMV
ACHTUNG : FÜR JEDE DIESER FUNKTIONEN DIE INPUTS/OUTPUTS DER SOFTWARE DES LMV KORREKT EINSTELLEN
PER APPLICAZIONI DIVERSE DA QUELLE INDICATE NELLO SCHEMA FARE RIFERIMENTO AL MANUALE LMV5...
FOR ANY APPLICATION OTHER THAN THE ONE IN THE DRAWING REFER TO THE LMV5... HANDBOOK
POUR DES APPLICATIONS AUTRES QUE CELLES INDIQUÉES DANS LE SCHÉMA SE RÉFÉRER AU MANUEL LMV5...
FÜR ANDERE ANWENDUNGEN ALS AUF DEM PLAN ANGEGEBEN IST AUF DIE ANLEITUNG LMV5... BEZUG ZU NEHMEN
BU = BLU / BLEU / BLAU
BK = NERO / BLACK / NOIR / SCHWARZ
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GY= GRIGIO / GREY / GRIS / GRAU
PK= ROSA / PINK / ROSE / ROSA
GO= ORO / GOLD / OR / GOLD
TQ= TURCHESE / TURQUOISE / TURQUOISE / TURKISBLAU
SR= ARGENTO / SILVER / ARGENT / SILBER
GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN
COLLEGAMENTI ELETTRICI A CURA DELL' INSTALLATORE
ELECTRICAL CONNECTIONS SET BY INSTALLER
ELEKTROANSCHLÜSSE VOM INSTALLATEUR AUSZUFÜHREN RACCORDEMENTS ÉLECTRIQUE EFFECTUÉ PAR L' INSTALLATEUR
Sheet : 14

Wiring layout key

A1	Electronic cam
A2	Module O2 type PLL...
AZL	Display and calibration unit
BA	Probe with output under current
BA1	Device with output undercurrent, for modifying remote setpoint
BA2	Light signalling burner lockout and reset button
BP	Pressure probe
BP1	Pressure probe
BT3	Probe Pt100, 3 wires
BT4	Probe Pt100, 3 wires
BT5	Probe Pt100, 2 wires
BV	Output probe in voltage
BV1	Output devicein voltage to modify remote setpoint
F1	Fan motor thermal relay
FU	Auxiliary circuits safety fuse
G10	Sensor O2 type QGO20...
G20	Probe Pt100, 2 wires
G30	Probe Pt100, 2 wires
H	Burner working lighting signal output
H1	Burner working signal
H2	Trip thermal signal
ION	Ionisation probe
KM	Direct start up contactor
K1	Clean contacts output relay burner switched on
K2	Clean contacts output relay burner lockout
KL1	Star/triangle starter line contactor
KT1	Star/triangle starter triangle contactor
KS1	Start/triangle starter star contactor
KST1	Star/triangle starter timer
MV	Fan motor
PA	Air pressure switch
PE	Burner earth
PGMax	Maximum gas pressure switch
PGMin	Minimum gas pressure switch
PGVP	Gas pressure switch for valve leak detection control device
QRI	Flame sensor
RS	Burner reset switch
S1	Safety button
S2	0/AUTO selector
SH3	Burner lock-out signal and reset switch
SM1	Air servomotor
SM2	Gas servomotor
TA	Ignition transformer
TL	Limit thermostat/pressure switch
TR	Adjustment thermostat/pressure switch
TS	Safety thermostat/pressure switch
T1	Transformer for electronic cam
T2	Auxiliary transformer for servomotors
Y	Gas regulator valve + gas safety valve
X1	Main terminal supply board
XAZL	Plug for on board display
XPGMax	Maximum gas pressure switch connector
XPGMin	Minimum gas pressure switch connector
XPGVP	Gas pressure switch connector for valve leak detection control device

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