URB40
URB70

Gas burners

Microprocessor controlled

LMV5x

MANUAL OF INSTALLATION - USE - MAINTENANCE

CIB UNIGAS

BURNERS - BRUCIATORI - BRULERS - BRENNER - QUEMADORES - ГОРЕЛКИ

M039646CA 0.0 06/2021

DANGERS, WARNINGS AND NOTES OF CAUTION

This manual is supplied as an integral and essential part of the product and must be delivered to the user.

Information included in this section are dedicated both to the user and to personnel following product installation and maintenance.

The user will find further information about operating and use restrictions, in the second section of this manual. we highly recommend to read it.

Carefully keep this manual for future reference.

The following:

- Entails the customer's acknowledgement and acceptance of the company's general terms and conditions of sale, in force at the date of order confirmation and available in the appendix to the current price lists.
- Is intended exclusively for specialised, experienced and trained users able to operate in conditions that are safe for people, the device and the environment, and in full compliance with the requirements set out on the following pages and with current health and safety regulations.

Information regarding assembly/installation, maintenance, replacement and repair is always and exclusively intended for (and therefore only to be carried out by) specialised personnel and/or directly by the Authorised Technical Service

IMPORTANT :

The supply has been made at the best conditions on the basis of the customer's order and technical indications concerning the state of the places and the installation systems, as well as the need to prepare certain certifications and / or additional adaptations with respect to the standard observed and transmitted for each product. In this respect, the manufacturer declines any responsibility for complaints, malfunctions, criticalities, damages and/or anything else consequent to incomplete, inaccurate and/or missing information, as well as failure to comply with the technical requirements and installation regulations, initial start-up, operational management and maintenance.

For proper operation of the device, it is necessary to ensure the readability and conservation of the manual, also for future reference. In case of deterioration or more simply for reasons of technical and operational insight, contact the manufacturer directly. Text, descriptions, images, examples and anything else contained in this document are the exclusive property of the manufacturer. Any reproduction is prohibited.

RISK ANALYSIS

Instruction manual supplied with the burner:

This 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. In the event of damage or loss, another copy must be requested from the local customer service centre;

Delivery of the system and instruction manual

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The supplier of the system is obliged to accurately inform the user about:– Use of the system;

– any further testing that may be necessary before activating the system;

– maintenance and the requirement to have the system checked at least once a year by a contractor or other specialised technician.

To ensure periodic monitoring, the manufacturer recommends drawing up a Maintenance Agreement.

WARRANTY AND LIABILITY

In particular, warranty and liability claims will no longer be valid in the event of damage to persons and/or property if such damage is 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;
- Operation by unqualified personnel;
- Carrying out of unauthorised changes to the device;
- 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;
- Use of the burner even after an error and/or 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 supervision and care of the burner components most subject to wear and tear;
- Use of non-original components, whether spare parts, kits, accessories and optionals;
- Force majeure.

Furthermore, the manufacturer declines all responsibility for non-compliance with this manual.



WARNING! Failure to comply with this manual, operational negligence, incorrect installation and unauthorised modifications will result in the manufacturer's warranty for the burner being voided.

Personnel training

The user is the person, organisation or company that has acquired the appliance and intends to use it for the specific purpose. The user is responsible for the appliance and for training the personnel that operate it.

The user:

- Undertakes to entrust the machine to suitably trained and qualified personnel;
- Must take all measures necessary to prevent unauthorised people gaining access to the appliance;
- Undertakes to adequately inform personnel about application and observance of the safety requirements, and therefore ensure that they are familiar with the operating instructions and safety requirements;
- Must inform the manufacturer if any faults or malfunctions of the accident prevention systems occur, and if there is any suspected danger;
- Personnel must always use the personal protective equipment required by law and follow the instructions provided in this manual;
- Personnel must observe all danger and caution notices on the appliance;
- Personnel must not carry out, on their own initiative, operations or interventions outside their area of expertise;
- Personnel must inform their superiors of any problem and danger that may arise;
- The assembly of parts of other makes, or any modifications made, may alter the characteristics of the appliance and may therefore compromise operational safety. The manufacturer therefore declines all responsibility for damages arising from the use of non-original parts.

GENERAL INTRODUCTION

- The equipment must be installed in compliance with the regulations in force, following the manufacturer's instructions, by qualified personnel.
- Qualified personnel means those having technical knowledge in the field of components for civil or industrial heating systems, sanitary hot water generation and particularly service centres authorised by the manufacturer.
- Improper installation may cause injury to people and animals, or damage to property, for which the manufacturer cannot be held liable.
- Remove all packaging material and inspect the equipment for integrity.

In case of any doubt, do not use the unit - contact the supplier.

The packaging materials (wooden crate, nails, fastening devices, plastic bags, foamed polystyrene, etc), should not be left within the reach of children, as they may prove harmful.

- Before any cleaning or servicing operation, disconnect the unit from the mains by turning the master switch OFF, and/or through the cutout devices that are provided.
- Make sure that inlet or exhaust grilles are unobstructed.
- In case of breakdown and/or defective unit operation, disconnect the unit. Make no attempt to repair the unit or take any direct action.

Contact qualified personnel only.

Units shall be repaired exclusively by a servicing centre, duly authorised by the manufacturer, with original spare parts and accessories.

Failure to comply with the above instructions is likely to impair the unit's safety.

To ensure equipment efficiency and proper operation, it is essential that maintenance operations are performed by qualified personnel at regular intervals, following the manufacturer's instructions.

- When a decision is made to discontinue the use of the equipment,

those parts likely to constitute sources of danger shall be made harmless.

- In case the equipment is to be sold or transferred to another user, or in case the original user should move and leave the unit behind, make sure that these instructions accompany the equipment at all times so that they can be consulted by the new owner and/or the installer.
- This unit shall be employed exclusively for the use for which it is meant. Any other use shall be considered as improper and, therefore, dangerous.

The manufacturer shall not be held liable, by agreement or otherwise, for 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.

The damages resulting from improper installation, use and failure to comply with the instructions supplied by the manufacturer.The occurrence of any of the following circustances may cause explosions, polluting unburnt gases (example: carbon monoxide CO), burns, serious harm to people, animals and things:

- Failure to comply with one of the WARNINGS in this chapter
- Incorrect handling, installation, adjustment or maintenance of the burner
- Incorrect use of the burner or incorrect use of its parts or optional supply

SPECIAL INSTRUCTIONS FOR BURNERS

a Make the following checks:

- • the burner should be installed in a suitable room, with ventilation openings complying with the requirements of the regulations in force, and sufficient for good combustion;
- • only burners designed according to the regulations in force should be used;
- • this burner should be employed exclusively for the use for which it was designed;
- • before connecting the burner, make sure that the unit rating is the same as delivery mains (electricity, gas oil, or other fuel);
- • observe caution with hot burner components. These are, usually, near to the flame and the fuel pre-heating system, they become hot during the unit operation and will remain hot for some time after the burner has stopped.

When the decision is made to discontinue the use of the burner, the user shall have qualified personnel carry out the following operations:

a • remove the power supply by disconnecting the power cord from the mains;

b • disconnect the fuel supply by means of the hand-operated shutoff valve and remove the control handwheels from their spindles.

Special warnings

- Make sure that the burner has, on installation, been firmly secured to the appliance, so that the flame is generated inside the appliance firebox.
- Before the burner is started and, thereafter, at least once a year, have qualified personnel perform the following operations:
  - a set the burner fuel flow rate depending on the heat input of the appliance;
  - b set the flow rate of the combustion-supporting air to obtain a combustion efficiency level at least equal to the lower level required by the regulations in force;
  - c check the unit operation for proper combustion, to avoid any harmful or polluting unburnt gases in excess of the limits permitted by the regulations in force;
  - d make sure that control and safety devices are operating properly;
  - e make sure that exhaust ducts intended to discharge the products of combustion are operating properly;
  - f on completion of setting and adjustment operations, make sure that all mechanical locking devices of controls have been duly tightened;
  - g make sure that a copy of the burner use and maintenance instructions is available in the boiler room.
- In case of a burner shut-down, reser the control box by means of the RESET pushbutton. If a second shut-down takes place, call the Technical Service, without trying to RESET further.
- The unit shall be operated and serviced by qualified personnel only, in compliance with the regulations in force.

GENERAL INSTRUCTIONS DEPENDING ON FUEL USED

ELECTRICAL CONNECTION

- For safety reasons the unit must be efficiently earthed and installed as required by current safety regulations.
- It is vital that all saftey requirements are met. In case of any doubt, ask for an accurate inspection of electrics by qualified personnel, since the manufacturer cannot be held liable for damages that may be caused by failure to correctly earth the equipment.
- Qualified personnel must inspect the system to make sure that it is adequate to take the maximum power used by the equipment shown on the equipment rating plate. In particular, make sure that the system cable cross section is adequate for the power absorbed by the unit.
- No adaptors, multiple outlet sockets and/or extension cables are permitted to connect the unit to the electric mains.
- An omnipolar switch shall be provided for connection to mains, as required by the current safety regulations.
- The use of any power-operated component implies observance of a few basic rules, for example:
  - do not touch the unit with wet or damp parts of the body and/or with bare feet;
  - do not pull electric cables;
  - do not leave the equipment exposed to weather (rain, sun, etc.) unless expressly required to do so;
  - do not allow children or inexperienced persons to use equipment;
- The unit input cable shall not be replaced by the user. In case of damage to the cable, switch off the unit and contact qualified personnel to replace.

When the unit is out of use for some time the electric switch supplying all the power-driven components in the system (i.e. pumps, burner, etc.) should be switched off.

FIRING WITH GAS, LIGHT OIL OR OTHER FUELS GENERAL

General Warnings

- The burner shall be installed by qualified personnel and in compliance with regulations and provisions in force; wrong installation can cause injuries to people and animals, or damage to property, for which the manufacturer cannot be held liable.
- Before installation, it is recommended that all the fuel supply system pipes be carefully cleaned inside, to remove foreign matter that might impair the burner operation.
- Before the burner is commissioned, qualified personnel should inspect the following:
  - a the fuel supply system, for proper sealing;
  - b the fuel flow rate, to make sure that it has been set based on the firing rate required of the burner;
  - c the burner firing system, to make sure that it is supplied for the designed fuel type;
  - d the fuel supply pressure, to make sure that it is included in the range shown on the rating plate;
  - e the fuel supply system, to make sure that the system dimensions are adequate to the burner firing rate, and that the system is equipped with all the safety and control devices required by the regulations in force.
- When the burner is to remain idle for some time, the fuel supply tap or taps should be closed.

Special instructions for using gas

Have qualified personnel inspect the installation to ensure that:

- a the gas delivery line and train are in compliance with the regulations and provisions in force;
- b all gas connections are tight;
- c the boiler room ventilation openings are such that they ensure the air supply flow required by the current regulations, and in any case are sufficient for proper combustion.

- Do not use gas pipes to earth electrical equipment.
- Never leave the burner connected when not in use. Always shut the gas valve off.
- In case of prolonged absence of the user, the main gas delivery valve to the burner should be shut off.

BURER DATA PLATE

For the following information, please refer to the data plate:

- Burner type and burner model: must be reported in any communication with the supplier
- Burner ID (serial number): must be reported in any communication with the supplier
- Date of production (year and month)
- Information about fuel type and network pressure

	Consump
Type	--
Model	--
Year	--
S.Number	--
Output	--
Oil Flow	--
Fuel	--
Category	--
Gas Pressure	--
Viscosity	--
El.Supply	--
El.Consump.	--
Fan Motor	--
Protection	--
Drwaing n°	--
P.I.N.	--

Precautions if you can smell gas

a do not operate electric switches, the telephone, or any other item likely to generate sparks;

b immediately open doors and windows to create an air flow to purge the room;

c close the gas valves;

d contact qualified personnel.

- Do not obstruct the ventilation openings of the room where gas appliances are installed, to avoid dangerous conditions such as the development of toxic or explosive mixtures.

Using oil pressure gauges

Generally, pressure gauges are equipped with a manual valve. Open the valve only to take the reading and close it immediately afterwards.

SYMBOLS USED

WARNING	Failure to observe the warning may result in irreparable damage to the unit or damage to the environment
DANGER!	Failure to observe the warning may result in serious injuries or death.
WARNING	Failure to observe the warning may result in electric shock with lethal consequences.

BURNER SAFETY

The burners- and the configurations described below - comply with the regulations in force regarding health, safety and the environment. For more in-depth information, refer to the declarations of conformity that are an integral part of this Manual.

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DANGER! Incorrect motor rotation can seriously damage property and injure people.

.Do not touch any mechanical moving parts with your hands or any other part of your body. Injury hazard

Do not touch any parts containing fuel (i.e. tank and pipes). Scalding hazard

Do not use the burner in situations other than the ones provided for in the data plate.

Do not use fuels other than the ones stated.

Do not use the burner in potentially explosive environments.

Do not remove or by-pass any machine safety devices.

Do not remove any protection devices or open the burner or any other component while the burner is running.

Do not disconnect any part of the burner or its components while the burner is running.

Untrained staff must not modify any linkages.

- After any maintenance, it is important to restore the protection devices before restarting the machine.
- All safety devices must be kept in perfect working order.
- Personnel authorized to maintain the machine must always be provided with suitable protections.

ATTENTION: while running, the parts of the burner near the generator (coupling flange) are subject to overheating. Where necessary, avoid any contact risks by wearing suitable PPE.

Safety and prevention

- 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.

DIRECTIVES AND STANDARDS

Gas burners

European directives

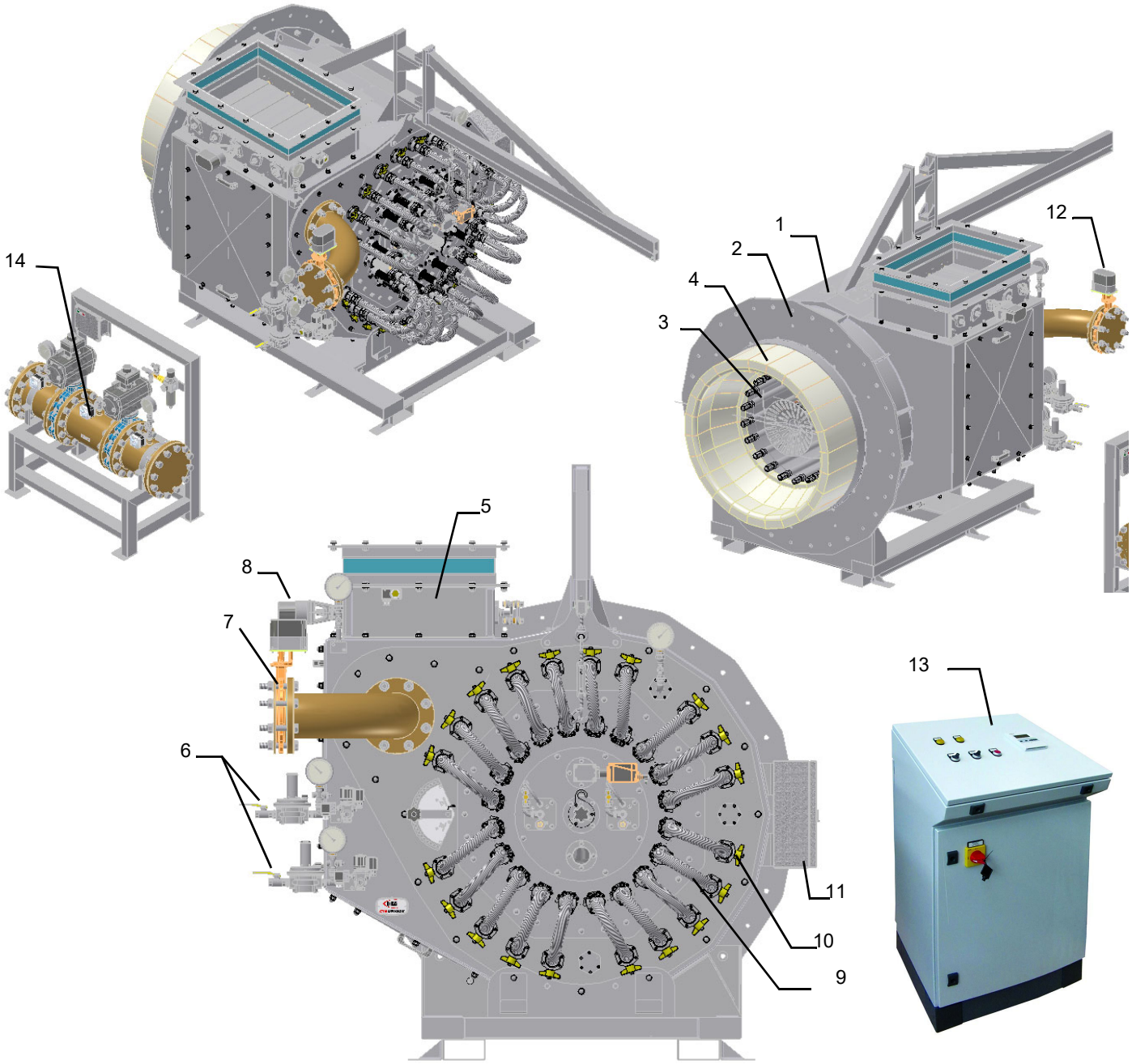
2016/426/UE (appliances burning gaseous fuels)
2014/35/UE (Low Tension Directive)
2014/30/UE (Electromagnetic compatibility Directive)
2006/42/CE (Machinery Directive)

Harmonized standards

UNI EN 676 (Automatic forced draught burners for gaseous fuels)
EN 55014-1 (Electromagnetic compatibility- Requirements for house hold appliances, electric tools and similar apparatus)
EN 60204-1:2006 (Safety of machinery – Electrical equipment of machines.)
CEI EN 60335-1 (Specification for safety of household and similar electrical appliances);
CEI EN 60335-2-102 (Household and similar electrical appliances. Safety. Particular requirements for gas, oil and solid-fuel burning appliances having electrical connections).
UNI EN ISO 12100:2010 (Safety of machinery - General principles for design - Risk assessment and risk reduction);

PART I: SPECIFICATIONS

BURNERS FEATURES



1 Wind box
2 Burner flange
3 Gas lances and nozzles
4 Blast tube
5 Air damper
6 Pilot gas train
7 Butterfly valve
8 Air actuator
9 Flexible hoses
10 Manual valves
11 Junction box
12 Gas servodrive
13 Control panel with separate lectern
14 Main gas train

Blast tube

URB burner series is supplied with a refractory blast tube made by a set of preformed and precooked refractory bricks including from average 59% Al_2O_3.

The tiles must be mounted at site on the boiler front wall by professional and qualified personnel, according to CIB UNIGAS lay-out drawings and recommendations.

Gas lances and nozzles

The natural gas flow, regulated by a motorised butterfly valve, reaches a gas ring and, passing through flexible hoses and manual valves, it enters into several lances to be guided up to the gas nozzles.

The stainless steel nozzle series is distributed all around the refractory blast tube, in order to optimize the gas distribution into the combustion chamber, for an high combustion efficiency and to limit the production of thermal oxides of nitrogen (NOx) and carbon monoxide (CO).

Each lance, so each nozzle, can be adjusted and removed during the operation in the plant (start-up and maintenance).

Windbox and Register Assembly

The burner windbox is assembled of heavy gauge welded steel.

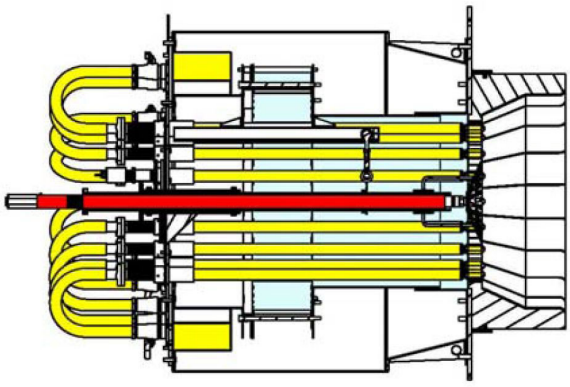
Insulated windboxes for use with pre-heated combustion air are available.

The offered machines are forced natural gas burners, designed with a single or a double air registers in reference to the output that the machine must develop.

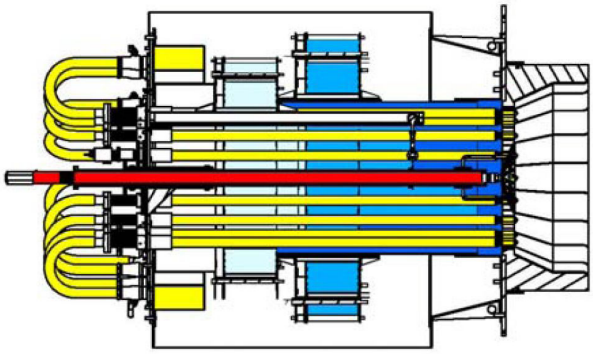
Two inspection doors are provided. They are not only useful for the maintenance, but they also offer the possibility to switch the position of the air damper to one of them, if the lay-out of the plant requires any adjustments on the site, or to add a second damper in case of a second combustion air stage or a flue gas recirculation where required.

Burner registers are designed and mounted in the windbox to permit an easy access for maintenance and to ensure a balanced air distribution in the windbox.

Each register is complete with a manual control handle and a mechanical indicator. The air registers will be adjusted in the proper position at the start-up, to ensure a proper flame distribution in the combustion chamber and an optimum mixing of fuel with turbulent air, to reach an high efficiency in terms of heat exchange and emission values.



Single register configuration



Double register configuration

Burner model identification

Burners are identified by burner type and model. Burner model identification is described as follows.

Type	**URB40**	Model	**M.**	**MD.**	**S.**	***.**	**G.**	**8.**	**200.**	**EI**
	(1)		**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**

1	BURNER TYPE	**URB40**
2	FUEL	M - Natural gas
3	OPERATION (Available versions)	MD - Fully modulating
4	BLAST TUBE	S - Standard
5	DESTINATION COUNTRY	* - see data plate
6	BURNER VERSION	G - Control panel and junction box
7	EQUIPMENT	8 = 2 gas valves + gas proving system + maximum gas pressure switch
8	GAS CONNECTION	200 = DN 200, 250 = DN 250
9	MICRO-PROCESSOR CONTROL	EI = with no O_2 trim control, with VSD control

Technical Specifications

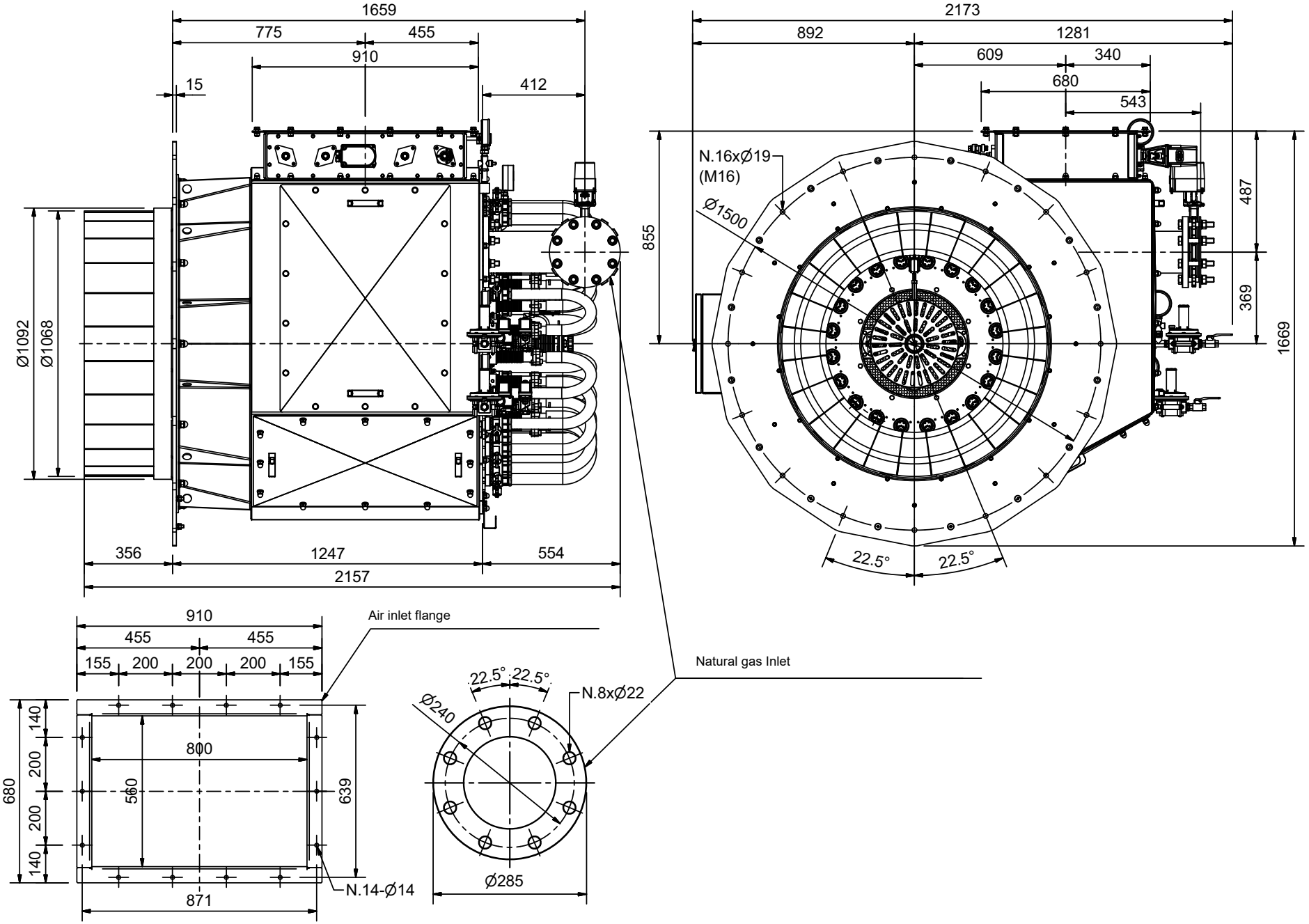
BURNER TYPE		**URB40**
Output	min - max kW	6917 - 41500
Fuel		M - Natural gas
Category		(see next paragraph)
Gas rate	min.-max. (Stm^3/h)	732 - 4392
Gas pressure		(see Note 2)
Power supply		230 V 1N ~ 50 Hz
Fan motor power consumption	kW	90,0
Total power consumption	kW	90,5
Protection		IP54
Operation		Fully modulating
Gas train	Ø Valves / Connections	200 / 200
Operating temperature	°C	-10 ÷ +50
Storage Temperature	°C	-20 ÷ +60
Working service		Continuous

Note1:	**All gas flow rates are referred to Stm^3/h (1013 mbar absolute pressure, 15 °C temperature) and are valid for G20 gas (net calorific value H_i = 34.02 MJ/Stm^3);**
Note2:	**Maximum gas pressure = 600 mbar** **Minimum gas pressure = see gas curves.**

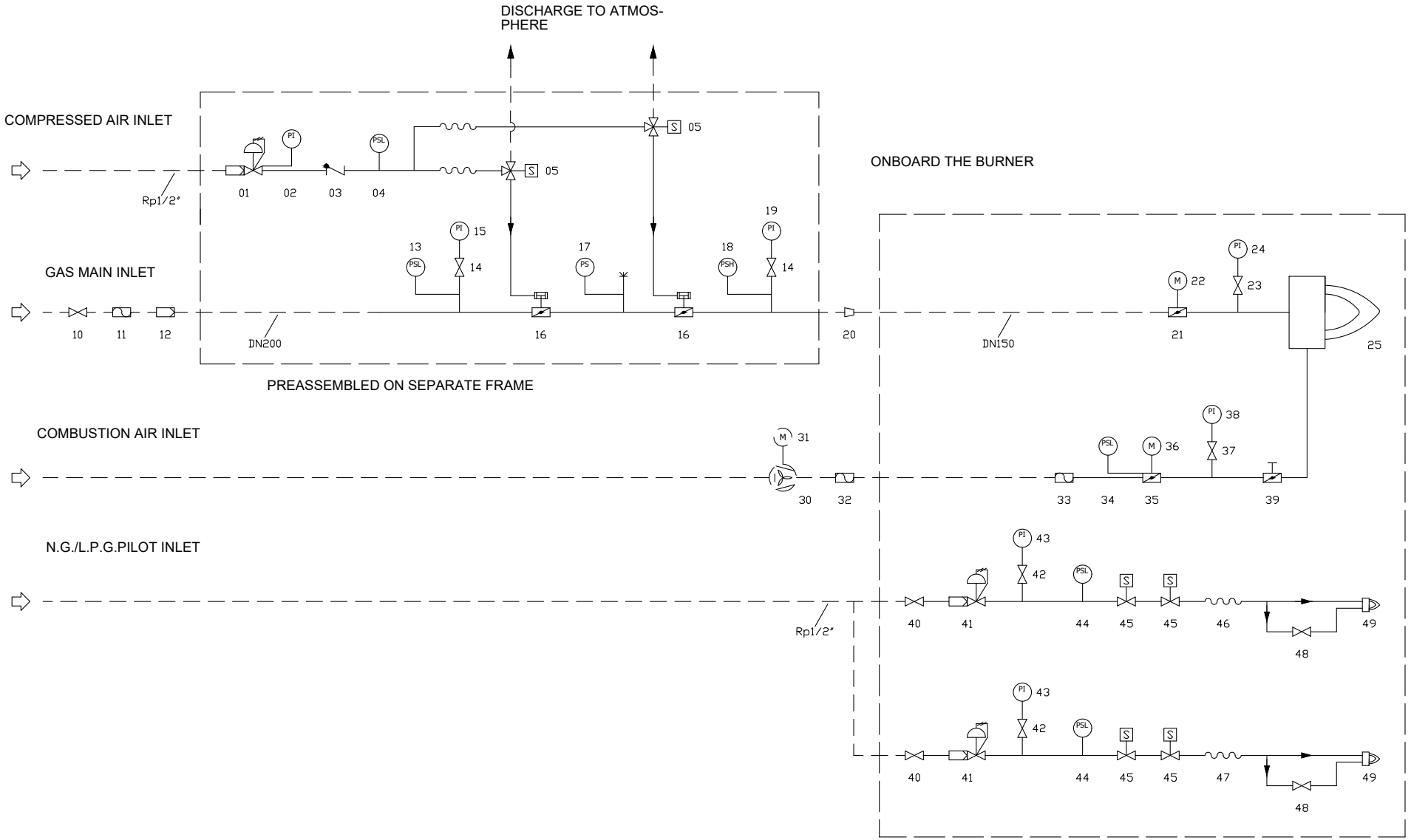
Country and usefulness gas categories

GAS CATEGORY	**COUNTRY**																								
I_{2H}	AT	ES	GR	SE	FI	IE	HU	IS	NO	CZ	DK	GB	IT	PT	CY	EE	LV	SI	MT	SK	BG	LT	RO	TR	CH
I_{2E}	LU	PL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$I_{2E(R)B}$	BE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
I_{2L}	NL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
I_{2ELL}	DE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
I_{2Er}	FR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Overall dimensions (mm)



HYDRAULIC DIAGRAMS

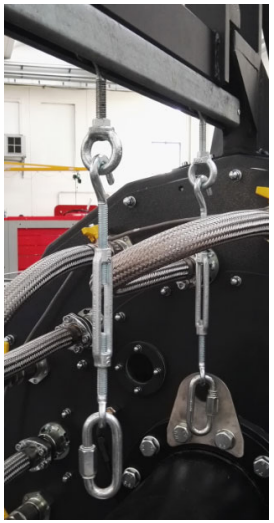


P&ID 20P1234	LEGEND
POS	**COMPRESSED AIR TRAIN**
01	Pressure governor with filter (air)
02	Pressure gauge (air)
03	Check valve
04	Air minimum pressure switch
05	3-way solenoid valve (air)
POS	**MAIN GAS TRAIN**
10	Gas manual valve (optional)
11	Gas antivibration joint (optional)
12	Gas filter
13	Gas pressure switch - min (PGMIN)
14	Manual valve
15	Pressure gauge
16	Lug butterfly valve (gas)
17	Leakage control pressure switch (gas) (PGCP)
18	Gas pressure switch - max (PGMAX)
19	Pressure gauge (gas)
20	Flanged pipe reducer (optional)
21	Butterfly valve (gas)
22	Gas servodrive
23	Manual valve
24	Pressure gauge (gas)
25	Main burner
POS	**COMBUSTION AIR**
30	Fan
31	Fan motor
32	Bellows unit
33	Bellows unit
34	Air pressure switch - min (PA)
35	Air inlet damper
36	Air servodrive
37	Manual valve
38	Pressure gauge (air) (optional)
39	Manual air register
POS	**PILOT GAS TRAIN (NG/LPG)**
40	Gas manual valve
41	Gas pressure regulator with filter
42	Manual valve
43	Pressure gauge (gas)
44	Gas pressure switch - min (PGP)
45	Gas electrovalve
46	Gas flexible hose (right pilot)
47	Gas flexible hose (left pilot)
48	Gas manual valve
49	Ignition pilot burner

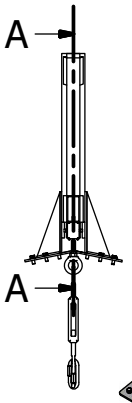
NOTES

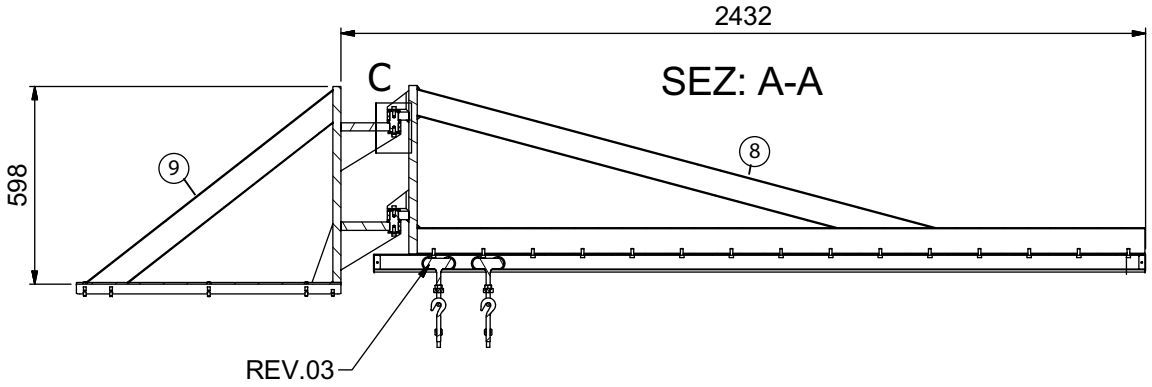
The following POS are supplied loose
11, 12, 20, 33

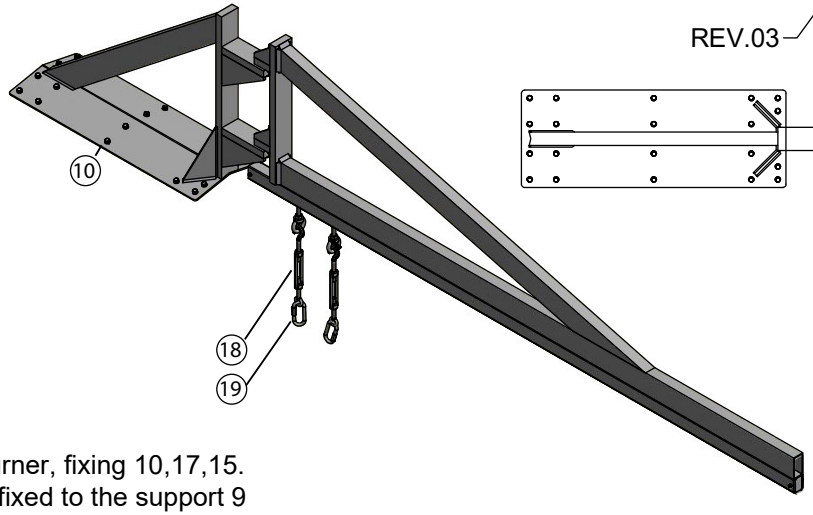
The following POS are **not** included in CIB Unigas supply
10, 30, 31, 32

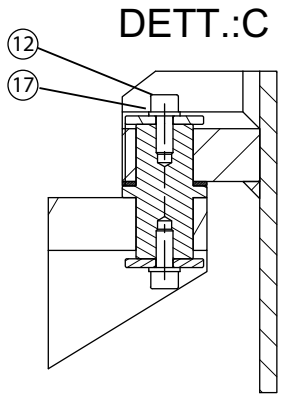


B
Eyebolts



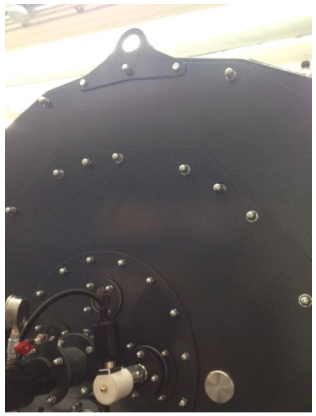






Mount part 9 on the top of the burner, fixing 10,17,15.
The handling support 8 must be fixed to the support 9 mounted on the top of the burner.

Remove the screws 12, 17 (Dett C) .
Place the handling support 8 and refix 12, 17.



Before inserting the support, remove the eye-bolt shown below:

PART II: INSTALLATION

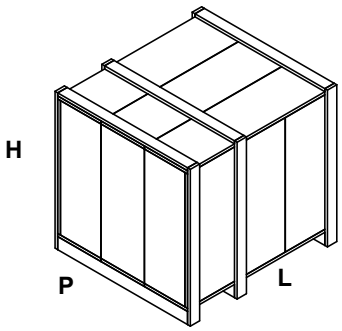
MOUNTING AND CONNECTING THE BURNER

Packing

The burners are despatched in wooden crates whose dimensions are:

BURNER PACKAGING:

2200mm x 2200mm x 2000 mm (L x P x H)



The burners are supplied in small wooden boxes:

2234mm x 1650mm x 1250 mm (L x P x H)

Packing cases of this type are affected by humidity and are not suitable for stacking.

The following are placed in each packing case:

- burner and gas train;
- accessories
- envelope containing this manual.

To get rid of the burner's packing, follow the procedures laid down by current laws on disposal of materials.

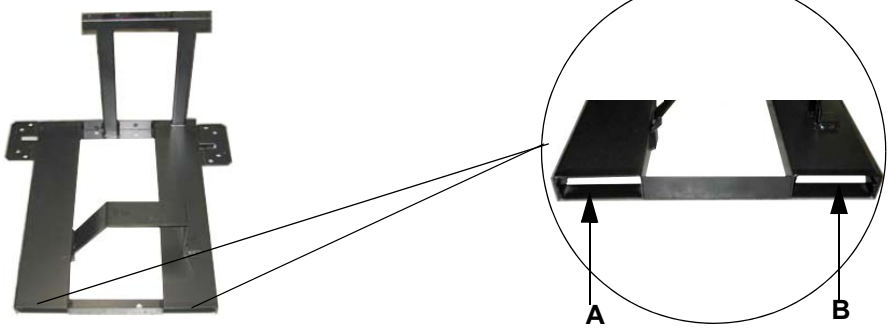
?? ???Handling the burner

WARNING! The handling operations must be carried out by specialised and trained personnel. If these operations are not carried out correctly, the residual risk for the burner to overturn and fall down still persists.

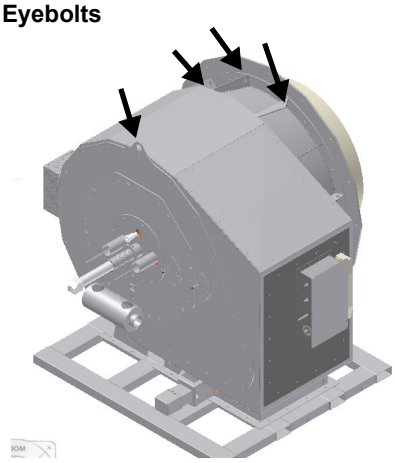
To move the burner, use means suitable to support its weight (see paragraph "Technical specifications").

The unpacked burner must be lifted and moved only by means of a fork lift truck.

The burner is mounted on a stirrup provided for handling the burner by means of a fork lift truck: the forks must be inserted into the A anb B ways. Remove the stirrup only once the burner is installed to the boiler.

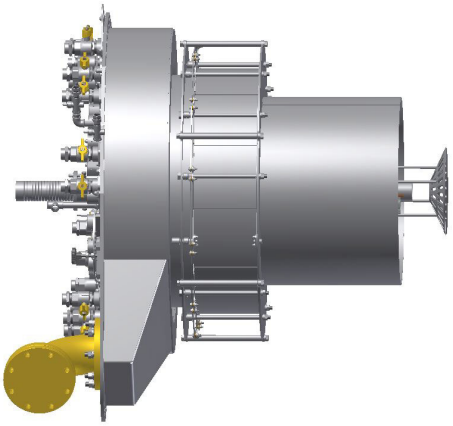


Eyebolts



The burner is provided with eyebolts, for handling operations.

Matching the burner to the boiler



Gas ring, register and gas guns group. To be installed on the air Windbox.



Air winbox to be mounted on the burner flange.



Burner Flange.



refracory tiles

If the lifting devices permit, mount the complete burner on the boiler, otherwise divide the burner into the parts shown.

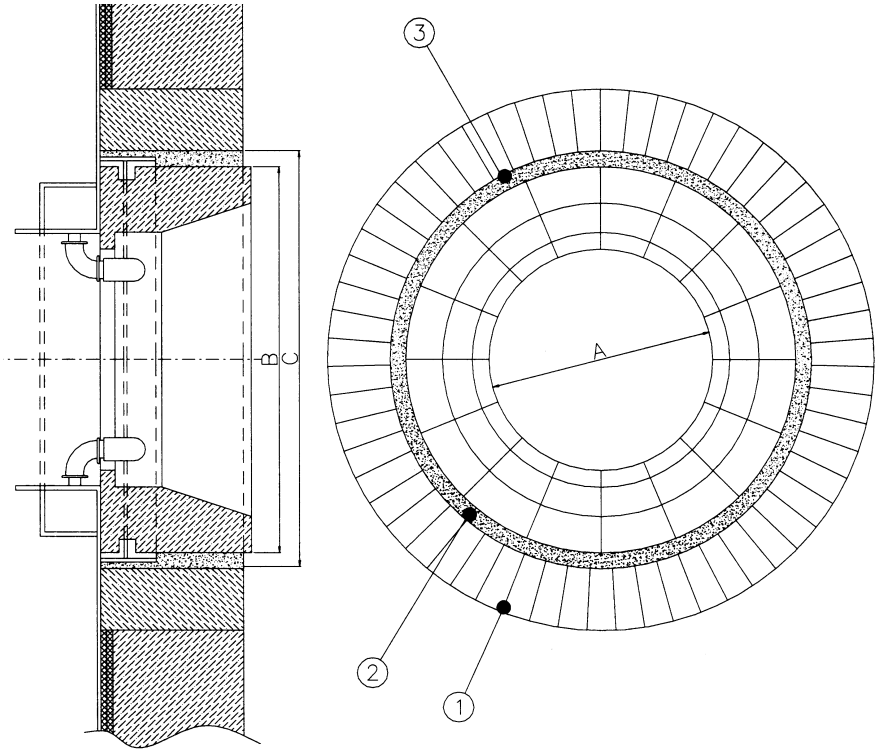


Install the complete burner on the boiler if the lifting devices permit, otherwise divide the burner into the parts shown.
Install the refractory from inside the boiler so as not to risk damaging it when handling the machine.
See the following paragraph for the installation of the refractory.

Refractory Tile

It is necessary that the tile be installed properly. There must be adequate room for expansion and the tile must not bear the weight of the boiler front wall refractory. It is also important that the tile not extend into the furnace area past the inner face of the boiler front refractory over 50 mm. Installation drawing below provides instructions for installing the tile segments. Important points to be considered during installation are:

- it is advisable to purchase the tile retainer ring with the burner tile. This ring should be continuously welded into place on the outside of the tile ring. The ring must be properly centered before welding.
- before the tile is installed, it is necessary to be sure no boiler frontwall refractory weight will be supported by the tile. It is advisable to install a refractory arch of either arch or circle brick or plastic refractory to an inside finished diameter noted on the installation drawing as “Furnace opening I.D. This provides a good solid background for the tile and removes the boiler frontwall refractory weight from the tile.
- the space between the burner tile and the refractory throat should be filled with a plastic refractory or castable on the bottom half of the throat to pick up the weight of the tile and should be filled with high temperature insulation on the top half to allow for tile and frontwall refractory expansion. A good bonding mortar of high temperature and low shrink should be used to bond the tile together.



Key

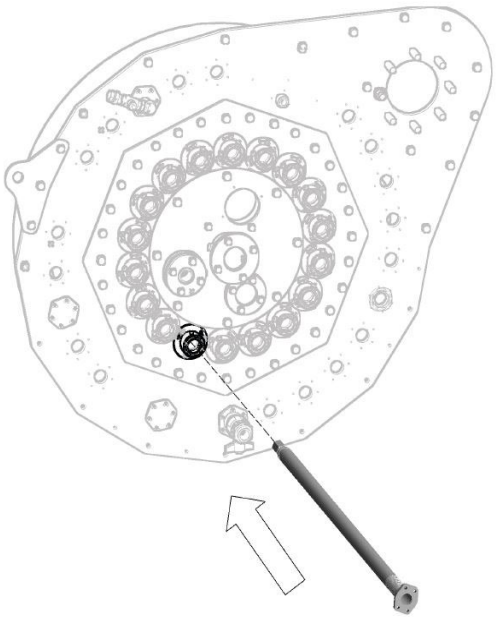
1 Firebrick ring not by CIB Unigas
2 Fill bottom half of space with castable or plastic refractory
3 Fill top half of space with high temperature insulation

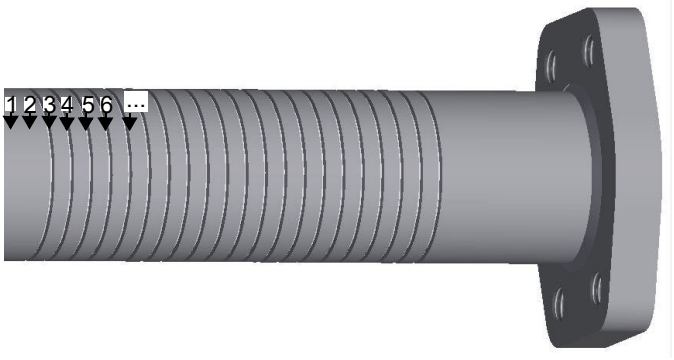
Fig. 4

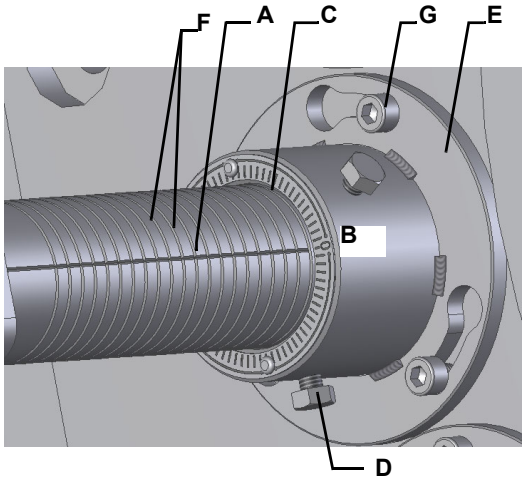
Rough dimensions of burner tile in mm

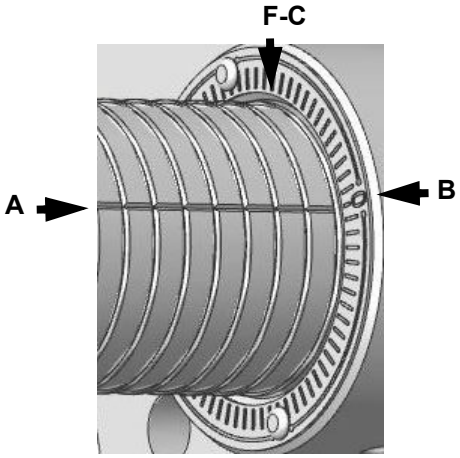
Tile size	URB5	URB10	URB15	URB20	URB25	URB30	URB32	URB35	URB40	URB45	URB50	URB60	URB70
A	305	356	406	457	508	559	610	660	711	762	813	864	914
B	660	711	762	813	864	914	965	1016	1067	1118	1168	1219	1270
C	711	762	813	864	914	965	1016	1067	1118	1168	1219	1270	1321

Mounting the gas guns

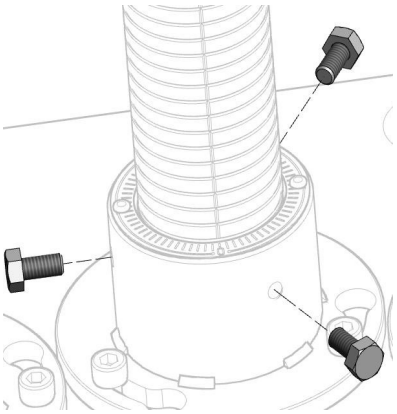






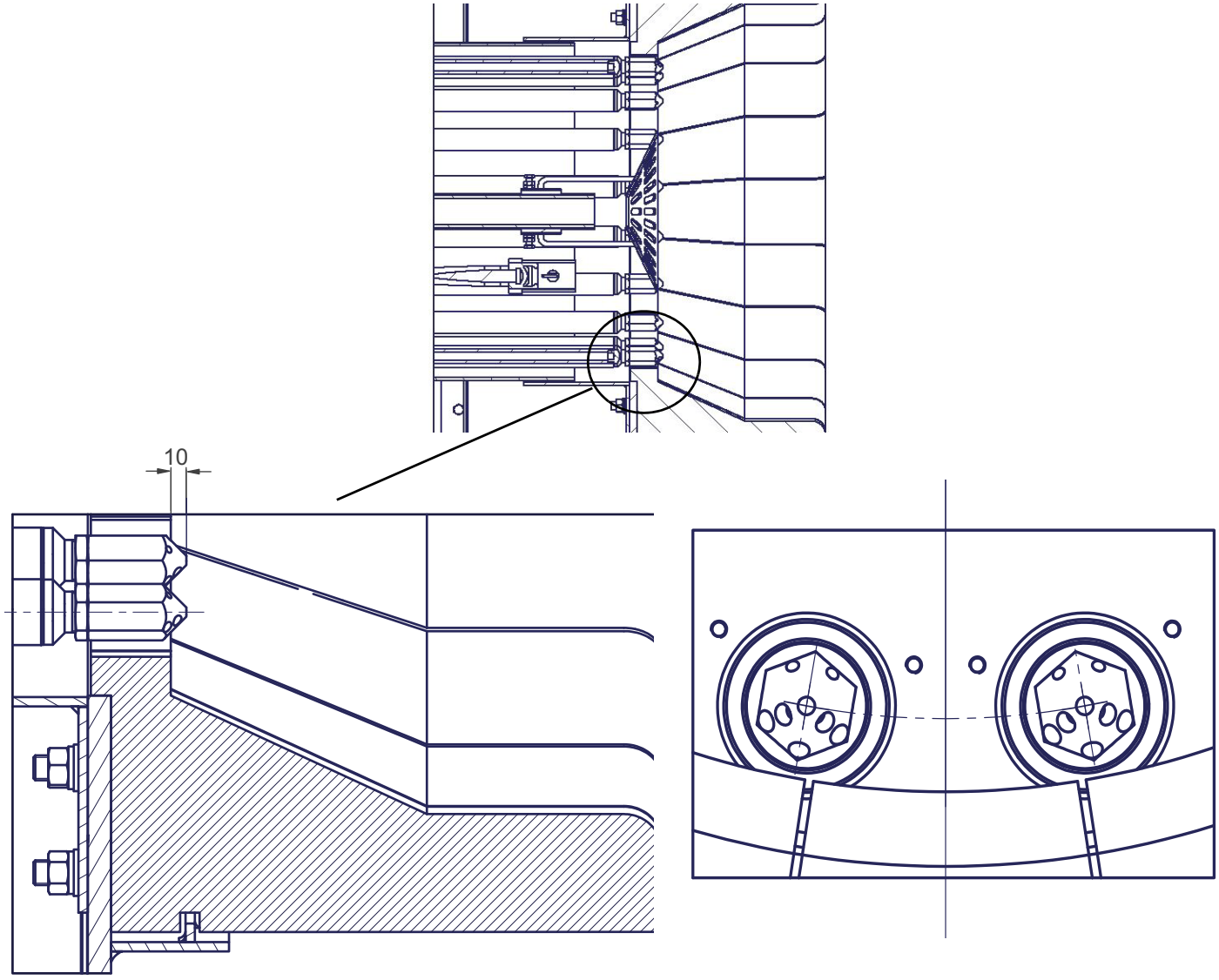


1 Align the reference notch **(A)** to the “0” mark **(B)**
2 Align the ring **(F)** with the edge **(C)**
3 Once the nozzle “0” position is set, tighten the three grub screws (ref. **D**) around the removable flange (ref **E**). Insert the flange (**E**) inside its site.In order to keep the lance referance and position during the mantenaince operation act on the allen screw (pos. **G**), rotate the flange and remove the lance.



ATTENTION: the zero (ref. B) position must be directed towards the axis of the flame
ATTENTION: During maintenance operation don't exchange the lance or their reference position

The following pictures show the factory set value of gas lances:

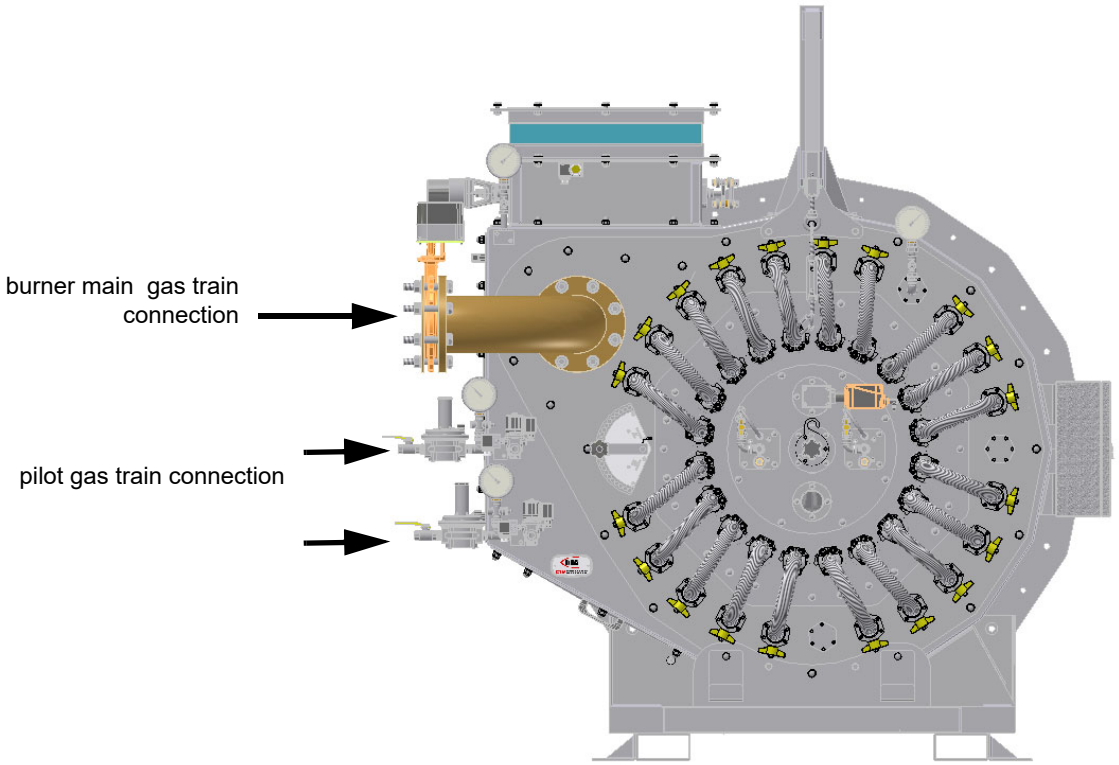


During the adjustment operations, a different configuration could be required, depending on the plant and the application involved.

GAS TRAIN CONNECTIONS

Referring to the P&ID of the burner, execute the connection.

WARNING: BEFORE EXECUTING THE CONNECTIONS TO THE GAS PIPE NETWORK, BE SURE THAT THE MANUAL CUTOFF VALVES ARE CLOSED.



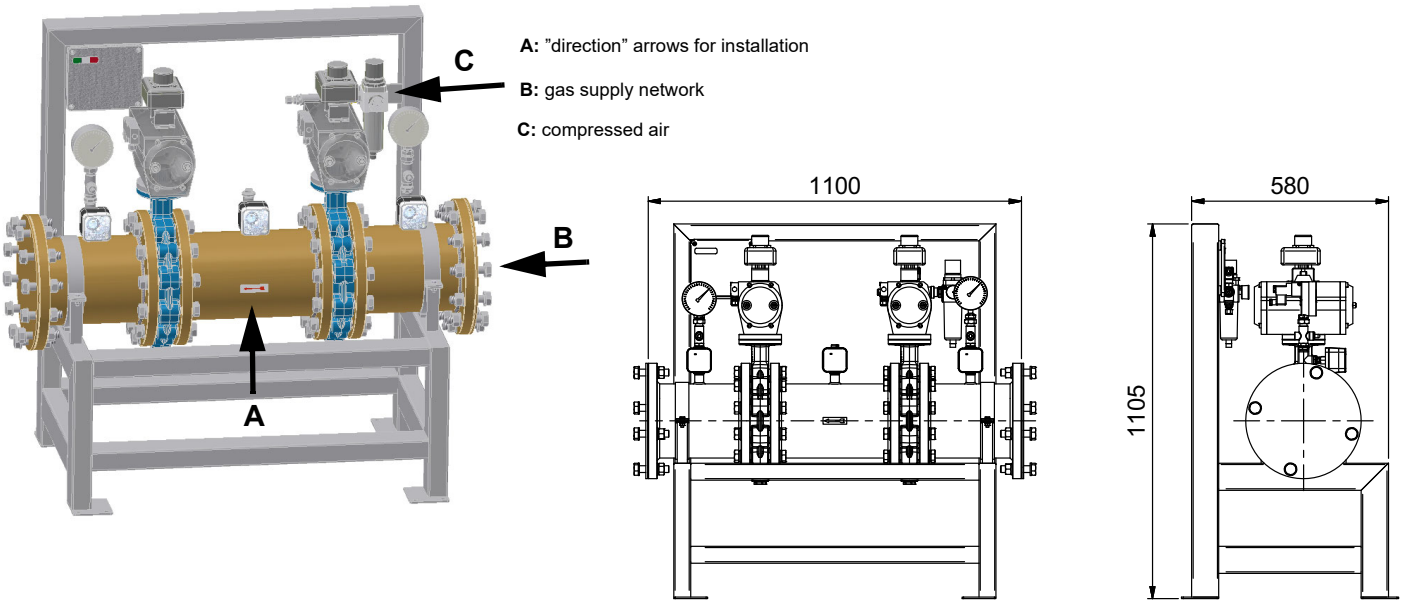


Рис. 5

ATTENTION: THE BURNED GAS RATE MUST BE READ AT THE GAS FLOW METER.

Gas Filter (if provided)

The gas filters remove the dust particles that are present in the gas, and prevent the elements at risk (e.g.: burner valves, counters and regulators) from becoming rapidly blocked. The filter is normally installed upstream from all the control and on-off devices.

ATTENTION: it is reccomended to install the filter with gas flow parallel to the floor in order to prevent dust fall on the safety valve during maintenance operation.

Once the train is installed, connect electrically all its elements: gas valves group and pressure switches.

ATTENTION: once the gas train is mounted according to the diagram on Fig. 4, the gas proving test mus be performed, according to the procedure set by the laws in force.

ATTENTION: it is recommended to mount filter and gas valves to avoid that extraneous material drops inside the valves, during maintenance and cleaning operation of the filters (both the filters outside the valves group and the ones built-in the gas valves).

Pilot burner

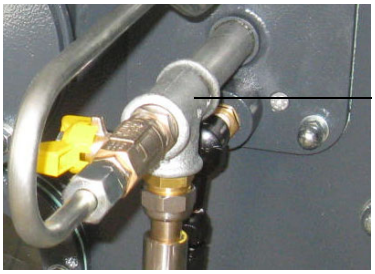
The burner is equipped with an electrically ignited gas pilot which can be operated with either natural or liquid petroleum gas.

It is composed by a net diffuser, an electrode for ignition, an isolator, one or two electromagnetic valves and a pressure governor. Pilots utilise also a raw gas tube that induces raw fuel into the pilot flame that greatly increases its size for ease of main flame ignition.

The pilot provides sufficient flame to instantly, reliably ignite the main burner fuel, providing that pressure has to be regulated in order to have a good flame; it means that:

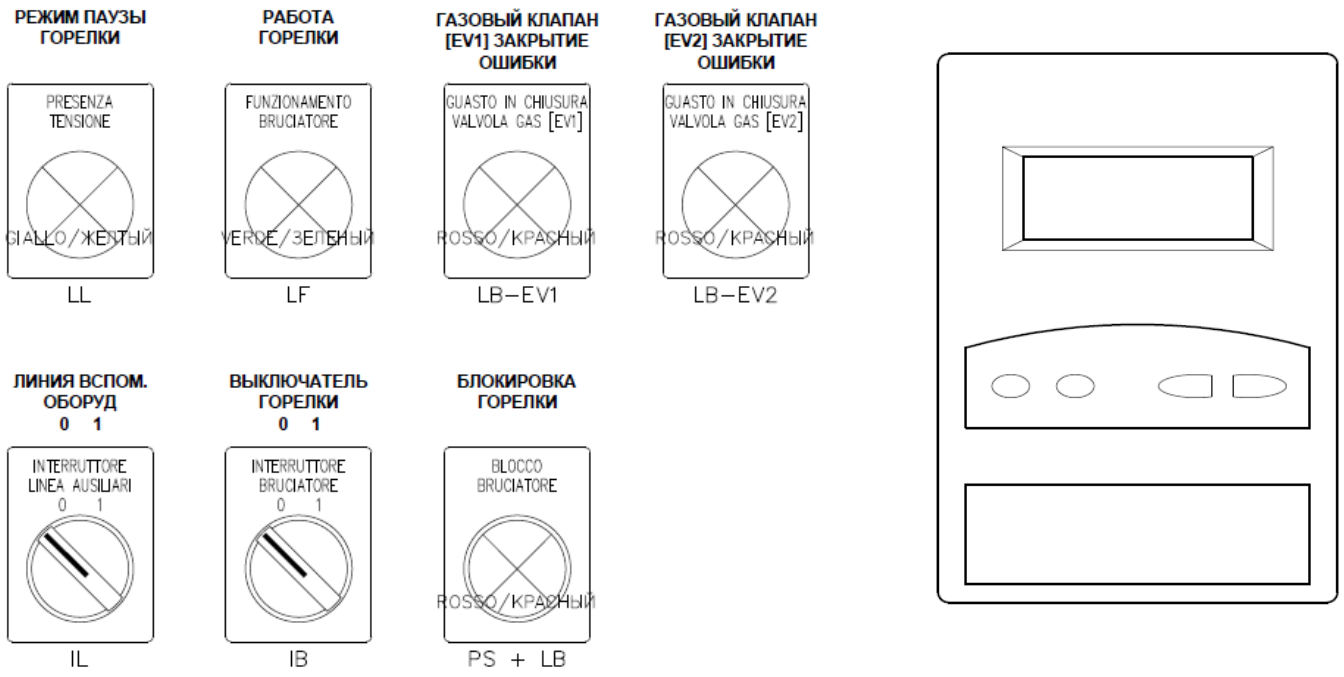
- pressure has not to drop too much for not loosing the flame
- pressure has not to increase too much for avoiding flame breaking.

The additional pipe T increases the flame length and facilitates the ignition



The pilot gas train is already installed to the burner, the following connections must be executed:

- connection from the filter with stabiliser to the gas supply network
- connection between pilot valves and the main gas train, by means of the pipe provided with the burner.



ELECTRICAL CONNECTIONS

WARNING! Respect the basic safety rules. make sure of the connection to the earthing system. do not reverse the phase and neutral connections. fit a differential thermal magnet switch adequate for connection to the mains.

WARNING! before executing the electrical connections, pay attention to turn the plant's switch to OFF and be sure that the burner's main switch is in 0 position (OFF) too. Read carefully the chapter "WARNINGS", and the "Electrical connections" section.

ATTENTION: Connecting electrical supply wires to the burner teminal block MA, be sure that the ground wire is longer than phase and neutral ones.

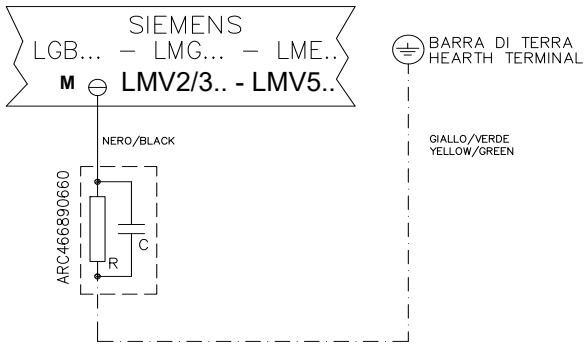
To execute the electrical connections, proceed as follows:

1 execute the electrical connections to the supply terminal board as shown in the attached wiring diagrams;
2 check the direction of the fan motor (see next paragraph);
3 do not reverse phase with neutral
4 ensure burner is properly earthed
5 refer to the attached document "RECOMMENDATIONS FOR LMV5x CONNECTIONS"

Note on elecrtical supply

If the power supply to the burner is 230V three-phase or 230V phase-phase (without a neutral), with the Siemens control box, between the terminal 2 (terminal X3-04-4 in case of LMV2x, LMV3x, LMV5x, LME7x) on the board and the earth terminal, an RC Siemens RC466890660 filter must be inserted.

Key
C - Capacitor (22nF/250V)
LME / LMV - Siemens control box
R - Resistor (1MΩ)
M - Terminal 2 (LGB,LMC,LME), terminal X3-04-4 (LMV2x, LMV3x, LMV5, LME7x)
RC466890660 - RC Siemens filter



For LMV5 control box, please refer to the clabeling recommendations avaible on the Siemens CD attached to the burner

PART III: OPERATION



WARNING: before starting the burner up, be sure that the manual cutoff valves are open and check that the pressure upstream the gas train complies the value quoted on paragraph "Technical specifications". Be sure that the mains switch is closed.

DANGER: During commissioning operations, do not let the burner operate with insufficient air flow (danger of formation of carbon monoxide); if this should happen, make the gas decrease slowly until the normal combustion values are achieved.

WARNING: never loose the sealed screws! otherwise, the device warranty will be immediately invalidate!

LIMITATIONS OF USE

THE BURNER IS AN APPLIANCE DESIGNED AND CONSTRUCTED TO OPERATE ONLY AFTER BEING CORRECTLY CONNECTED TO A HEAT GENERATOR (E.G. BOILER, HOT AIR GENERATOR, FURNACE, ETC.), ANY OTHER USE IS TO BE CONSIDERED IMPROPER AND THEREFORE DANGEROUS.

THE USER MUST GUARANTEE THE CORRECT FITTING OF THE APPLIANCE, ENTRUSTING THE INSTALLATION OF IT TO QUALIFIED PERSONNEL AND HAVING THE FIRST COMMISSIONING OF IT CARRIED OUT BY A SERVICE CENTRE AUTHORISED BY THE COMPANY MANUFACTURING THE BURNER.

A FUNDAMENTAL FACTOR IN THIS RESPECT IS THE ELECTRICAL CONNECTION TO THE GENERATOR'S CONTROL AND SAFETY UNITS (CONTROL THERMOSTAT, SAFETY, ETC.) WHICH GUARANTEES CORRECT AND SAFE FUNCTIONING OF THE BURNER.

THEREFORE, ANY OPERATION OF THE APPLIANCE MUST BE PREVENTED WHICH DEPARTS FROM THE INSTALLATION OPERATIONS OR WHICH HAPPENS AFTER TOTAL OR PARTIAL TAMPERING WITH THESE (E.G. DISCONNECTION, EVEN PARTIAL, OF THE ELECTRICAL LEADS, OPENING THE GENERATOR DOOR, DISMANTLING OF PART OF THE BURNER).

NEVER OPEN OR DISMANTLE ANY COMPONENT OF THE MACHINE EXCEPT FOR ITS MAINTENANCE.

TO SECURE THE MACHINE, ACT ON THE ISOLATOR SWITCH. IN CASE OF ANOMALIES THAT REQUIRED A SHUT DOWN OF THE BURNER, IT'S POSSIBLE TO ACT ON THE AUXILIARY LINE SWITCH, LOCATED ON THE BURNER FRONT PANEL.

IN CASE OF A BURNER SHUT-DOWN, RESET THE CONTROL BOX BY MEANS OF THE RESET PUSHBUTTON. IF A SECOND SHUT-DOWN TAKES PLACE, CALL THE TECHNICAL SERVICE, WITHOUT TRYING TO RESET FURTHER.

WARNING: DURING NORMAL OPERATION THE PARTS OF THE BURNER NEAREST TO THE GENERATOR (COUPLING FLANGE) CAN BECOME VERY HOT, AVOID TOUCHING THEM SO AS NOT TO GET BURNT.

ADJUSTING AIR AND FUEL FLOW RATES

Adjusting air and gas flow rates

WARNING! During commissioning operations, do not let the burner operate with insufficient air flow (danger of formation of carbon monoxide); if this should happen, make the fuel decrease slowly until the normal combustion values are achieved.

WARNING: any changes to the burner setting (intervention on the combustion head, air register, leverages, components for adjusting the flow rate, etc.) must be performed by qualified personnel, checking the combustion parameters by flue gas analyzer. This applies to all operations described in the following paragraphs.

WARNING! the combustion air excess must be adjusted according to the values in the following chart.

Recommended combustion parameters		
Fuel	Recommended (%) CO_2	Recommended (%) O_2
Natural gas	9 ÷ 10	3 ÷ 4,8

ATTENTION: THE BURNED GAS RATE MUST BE READ AT THE GAS FLOW METER.

Adjustments - brief description

The air and fuel rates adjustments must be performed at the maximum ouptput first (“high flame”): see the LMV5.. related manual..

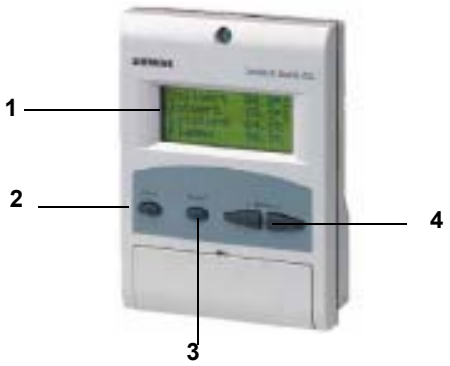
- Check that the combustion parameters are in the suggested limits.
- Then, adjust the combustion values by setting the “fuel/air” ratio” curvepoints (see the LMV5.. related manual).
- Set, now, the low flame output, in order to avoid the low flame output increasing too much or that the flues temperature gets too low to cause condensation in the chimney.

Adjusting procedure

Go on adjusting the burner.

Users can set only the LMV parameters that can be accessed without password: (see “Adjusting the temperature set-point”).

The Siemens AZL User Interface allows programming the Siemens LMV system and monitoring the system data.



The user interface is made of:

1. display: it showes menus and parameters
2. ESC key (previous level): it goes back to the prevoius level menu or exits the programming mode without changing data.
3. ENTER key (next level): it confirms the data changing and jumps to the next menu/parameter.
4. SELECT keys: they select a menu item and change the parameter values.

As far as the settings, see the LMV5 related manual.

By following the “air/gas ratio” curvepoints setting procedure on the LMV5.. manual, adjusting the air and gas flow rates: check, continuosly, the flue gas analisys, as to avoid combustion with little air; dose the air according to the gas flow rate change following the steps quoted below.

Once the throttle valve is completely opened, acting on the pressure stabiliser of the valves group, adjust the **gas flow rate in the high flame stage** as to meet the values requested by the boiler/utilisation:

Start-up procedure

1 Turn the burner on.

2 the LMV control box starts the system test cycle: the AZL display shows the **System Test** message; at the end of the test, it shows the main page and the system stops (the safety chain is open) waiting for the startup enabling signal (standby - Program phase no. 12)

Setpoint	80°C
Act.value	78°C
Fuel	GAS
Standby	12

Main page

3 check the fan motor rotation (see related paragraph).

4 make the safety chain enabling the system to start up

5 the combustion cycle starts: the system will show the operating stages

- Prepurging (program phase no.30)
- Driving to ignition position (program phase no.36)
- Ignition position (program phase no.38)
- Fuel (the fuel solenoid valves open)
- Flame (the flame lights up)
- Driving to low flame (the actuator drives to low flame).
NOTE: the **C** and **A**, on the .
Once the ignition cycle ends, the main page is shown:

Setpoint	80°C
Act.value	78°C
Load	24%
Flame	60%

Main page

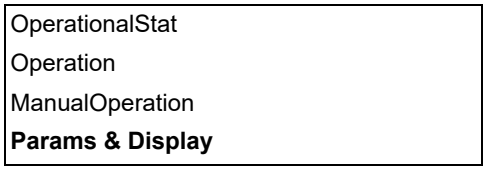
Set point: temperature set-point
Act value: actual temperature value
Load: load percentage (burner output)
Flame: percentage of flame detection current.
By pressing the ENTER key the display shows the second page:

Fuel	0.0	Air	1.8
Ax		VSD	0.0
Ax		O2	
Ax		Ld.	0.0

Second page

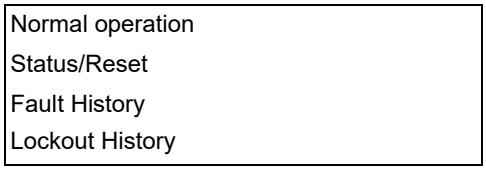
Fuel: it shows (in degrees) the fuel actuator position.
Air: it shows (in degrees) the air actuator position.
Ax1..3: auxiliaries.
VSD: % value on the inverter maximum frequency
O2: oxygen percentage
Ld: load percentage (burner output).

Press the ENTER key to go back to the main page.
To access the **main menu**, from the main page, press the ESC key tiwce:



Main menu

By pressing the ESC key once, the ***Operational Status*** (first item in the main menu) menu is directly shown:



the ***Operational Status*** menu provides the following items:

Normal operation: by selecting this item and pressing the ENTER key, the main page is showed; press ESC to go back to the main menu.

Status/Reset: it shows system errors or faults occuring / it represents the lockout reset function.

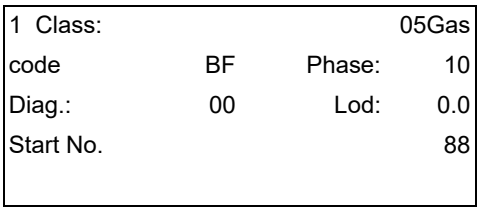
Fault History: by selecting this item and pressing the ENTER key, the Lockout History will be showed about the last 21 faults occured.

Lockout History: by selecting this item and pressing the ENTER key, the Lockout History will be showed about the last 9 lockouts occured, and the related date and hour.

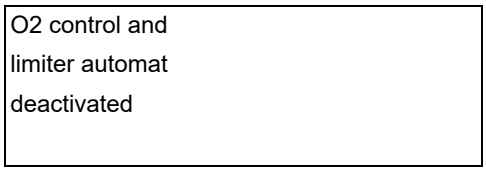
Alarm act/deact: enable/disable the horn in case of alarm.

Fault History

To visualise the **Fault History**, select it and press the ENTER key. The message will be as:



alternating by an error message as:

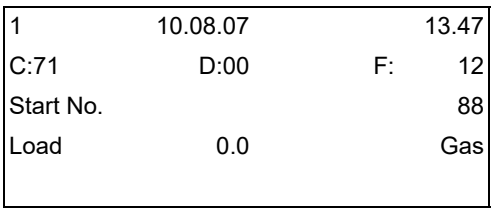


To see the other Fault History pages, press the arrow keys.

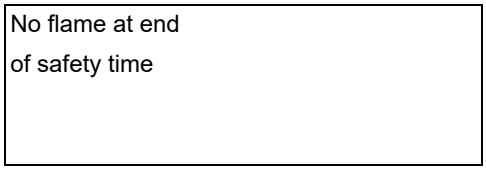
To exit the Fault History pages, press ESC.

Lockout History

To visualise the **Lockout History**, choose the related item and press ENTER. The message will be:



alternating by an error message as:



To see the other Lockout History pages, press the arrow keys.
To exit the Lockout History pages, press ESC.

Setting the temperature/pressure set-point value

To set the temperature/pressure set-point value, that is the generator operating temperature/pressure; proceed as follows.

From the main page, enter the main menu by pressing the ESC key twice:

OperationalStat
Operation
ManualOperation
Params & Display

by means of the arrow keys, select “Params&Display”, press ENTER: the system will ask you to enter the proper password

Access w-out PW
Access Serv
Access OEM
Access LS

by means of the arrow keys, select “Access w-out pass” (access without password - user level), confirm by pressing ENTER.
The other levels require password reserved to the Technical Service, to the Manifacurer, etc.
The menu shown accessing without password is the following:

BurnerControl
RatioControl
O2Contr./Guard.
LoadController

Choose “LoadController” and press ENTER: the following menu is shown:

ControllerParam
Configuration
Adaption
SW Version

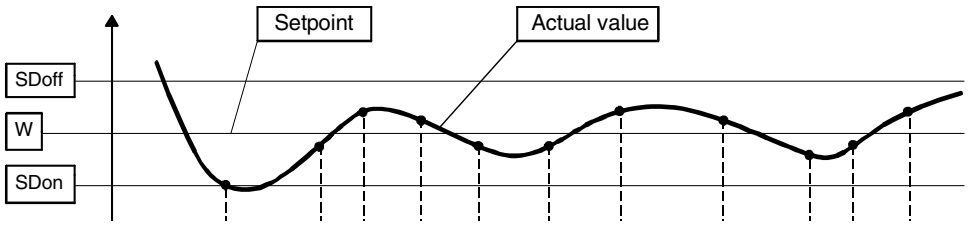
Choose “ControllerParam” and press ENTER: the following menu is shown:

ContrlParamList
MinActuatorStep
SW_FilterTmeCon
SetPointW1

Choose “**SetPointW1**” and press ENTER:

SetpointW1	
Curr:	90°
New:	90°

Curr: it shows the current set-point; use the arrows keys to change.
NOTE: the availabel range for this parameter depends on the probe provided; the unit measure of the detected value and its limits are bound up with parameters set at the “Service” level.
Once the new set-point is set, confirm by pressing ENTER, otherwise exit without changings by pressing ESC.
Press ESC to exit the set-point programming mode.
Once the temperature set-point W1 is imposed, set the Switch-on (SDon) and the Switch-off (SDoff) point of the 2-position controller:



To set these values, select the item SD_ModOn (SDOn), by scrolling down the “Load controller” menu with the arrow keys and press ENTER:

SetpointW1
SetpointW2
SD_ModOn
SD_ModOff

the display will show:

SD_ModOn	
Curr::	1.0%
New:	1.0%

The deafult value for this parameter is1% that is, the burner will light again at a temperature 1% lower than the set-point. Change value, if needed, by means of the arrow keys; press ENTER to confirm and the press ESC to exit. Press only ESC to exit without changing.

Now choose SD_ModOff always scrolling down theLoad Controller menu, by menas of the arrow keys, and press ENTER.

SetpointW1
SetpointW2
SD_ModOn
SD_ModOff

the display will show:

SD_ModOff	
Curr::	10.0%
New:	10.0%

The deafult value for this parameter is10% that is, the burner will turn off at a temperature 1% higher than the set-point.

Change value, if needed, by means of the arrow keys; press ENTER to confirm and the press ESC to exit. Press only ESC to exit without changing. Press the ESC key until the following menu is shown:

BurnerControl
RatioControl
O2Contr./Guard.
LoadController

scroll this menu down until the tiem “AZL” is reached

LoadController
AZL
Actuators
VSD Module

confirm by pressing ENTER:

Times
Languages
DateFormat
PhysicalUnits

Times: it sets the “Summer (SUM) Time / Winter (WIN) Time” operation and the continent (EU - Europe; US - United States)

Sum/Winter Time
Time EU/US

choose the Summertime/Wintertime mode desired and cofirm by pressing ENTER; press ESC to exit. Set the time zone (Time EU/US) in the same way.

Languages: it allows setting the current language

Language	
Curr::	Italiano
New:	English

choose the desired language and cofirm by pressing ENTER; press ESC to exit.

DateFormat: it allows setting the date format as DD-MM-YY (day-month-year) or MM-DD-YY (month-day-year)

DateFormat	
Curr::	DD-MM-YY
New:	MM-DD-YY

choose the desired format and cofirm by pressing ENTER; press ESC to exit.
PhysicalUnits: it allows setting the measuring units for temperature and pressure

UnitTemperature
UnitPressure

Settable temperature units: °C or °F
Settable pressure units: bar or psi.

- choose the desired unit and cofirm by pressing ENTER; press ESC to exit.
- choose the temperature and pressure unit and cofirm by pressing ENTER; press ESC to exit.

System lockout

If the system locks out, the following message will appear:

1	10.08.07		13.47
C:71	D:00	F:	12
Start No.			88
Load	0.0		Gas

call the Technical Service and tell the message data.

Cold start thermal shock (CSTP)

If the generator cannot suffer thermal shocks, the CSTP (Cold Start Thermal Schock) function can be enabled. This function is already set by the Technical service (access by reserved password).

if this function is enabled, when the burner starts upthe “Thermal shock protection activated” message will be showed.

If this function is not enabled, after startup, the burner will rapidly increase the load according to the requested value and, if necessary, to the maximum output.

Manual mode

To by-pass the thermal protection or not to let the buner operate in high flame stage (maximum output) after ignition, the manual mode is provided.

To choose the manual mode (Manual Operation), use the SELECT arrow keys

OperationalStat
Operation
ManualOperation
Params & Display

Items to be set are the following:

SetLoad
Autom/Manual/Off

SetLoad: to set the required load percentage

SetLoad	
Curr::	0.0%
New:	20.0%

set the required percentage and confirm by pressing ENTER; press ESC to exit.

choose “Autom/Manual/Off

SetLoad
Autom/Manual/Off

Autom/Manual/Off	
Curr::	Automatic
New:	Burner On

three modes are provided:

Automatic: automatic operation

Burner on: manual operation

Burner off: burner in stand-by

If the BurnerOn mode is choosen,the burner does not follow the modulator and probe settings, but operates at the set load.

Caution: if BurnerOff mode is selected, the burner stays in stand-by.
Caution: in the BurnerOn mode, the safety thresholds are set by the Technical Service.

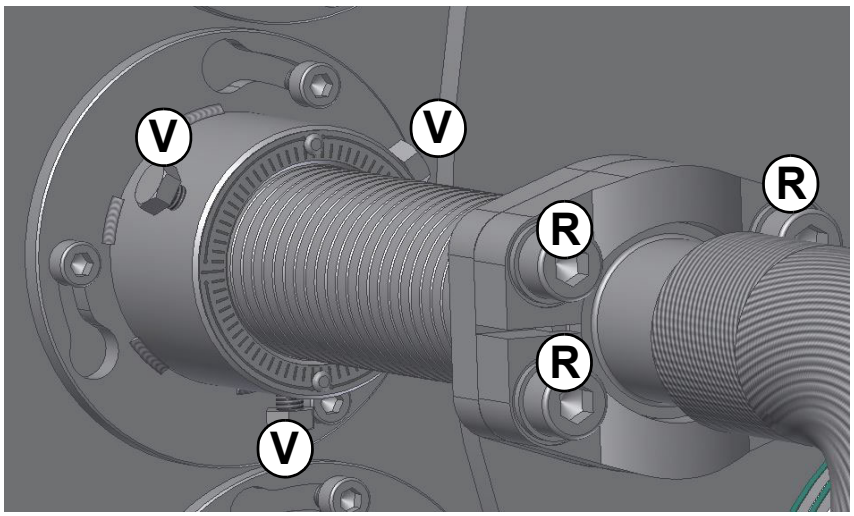
For further details, see the LMV5x annexed manuals.

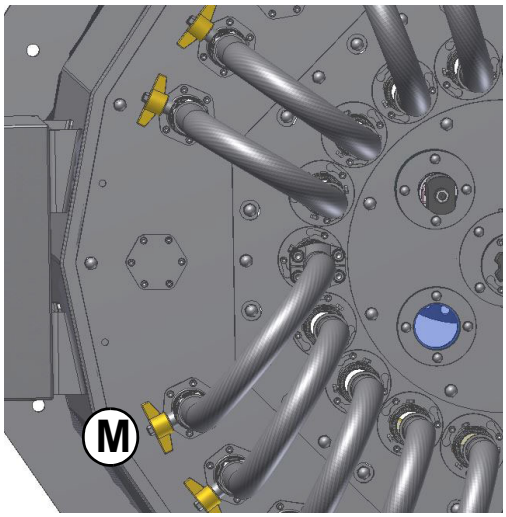
ADJUSTMENTS FOR GAS OPERATION

Adjusting the gas gun

The gas lances are already factory-set at standard position. Only when necessary, change the position following the next procedure:

- to move the lance back or forth, loosen the screws **V**, on each lance
- to rotate the lance, close the gas manual valve **M** on the lance, loosen the four screws **R** and **V** screws, without removing them; then rotate the lance in order to change the combustion according to the combustion resulted values.
- after the adjustment, remember to fasten all the screws





⚠ **Attention!** if it is necessary to change the gun position, repeat the air and gas adjustments described above.

Setting air pressure switches

The **air pressure switch** locks the control box if the air pressure is not the one requested. If it happens, unlock the burner by means of the control box unlock pushbutton, placed on the burner control panel.



Calibration gas leakage pressure switch (PGCP)

- remove the pressure switch plastic cover;
- adjust the PGCP pressure switch to the same value set for the minimum gas pressure switch;
- replace the plastic cover.

Adjusting the maximum gas pressure switch (when provided)

To calibrate the maximum pressure switch, proceed as follows according to its mounting position:

1 remove the pressure switch plastic cover;

2 if the maximum pressure switch is mounted upstreaam the gas valves: measure the gas pressure in the network, when flame is off; by means of the adjusting ring nut **VR**, set the value read, increased by the 30%.

3 if the maximum pressure switch is mounted downstream the “gas governor-gas valves” group and upstream the butterfly valve: light the burner, adjust it according to the procedure in the previous paragrph. Then, measure the gas pressure at the operating flow rate, downstream the “gas governor-gas valves” group and upstream the butterfly valve; by means of the adjusting ring nut **VR**, set the value read on step 2, increased by the 30%;

4 replace the plastic cover.

Calibration of low gas pressure switch

As for the gas pressure switch calibration, proceed as follows:

- Be sure that the filter is clean.
- Remove the transparent plastic cap.
- While the burner is operating at the maximum output, test the gas pressure on the pressure port of the minimum gas pressure switch.
- Slowly close the manual cutoff valve (placed upstream the pressure switch, see gas train installation diagram), until the detected pressure is reduced by 50%. Pay attention that the CO value in the flue gas does not increase: if the CO values are higher than the limits laid down by law, slowly open the cutoff valve as to get values lower than these limits.
- Check that the burner is operating correctly.
- Clockwise turn the pressure switch adjusting ring nut (as to increase the pressure value) until the burner stops.
- Slowly fully open the manual cutoff valve.
- Refit the transparent plastic cover on the pressure switch.

Calibration of air pressure switch

To calibrate the air pressure switch, proceed as follows:

- Remove the transparent plastic cap.
- Once air and fuel setting have been accomplished, startup the burner.
- During the pre-purge phase o the operation, turn slowly the adjusting ring nut **VR** in the clockwise direction (to increase the adjusting pressure) until the burner lockout, then read the value on the pressure switch scale and set it to a value reduced by 15%.
- Repeat the ignition cycle of the burner and check it runs properly.
- Refit the transparent plastic cover on the pressure switch.

Adjusting the pilot gas flow rate: gas valve Brahma EG12xR and pressure governor

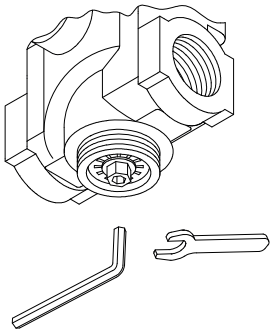
To change the pilot gas valve flow rate, proceed as follows:

1 remove the protection on the bottom of the valve, moving it counterclockwise (see next picture);

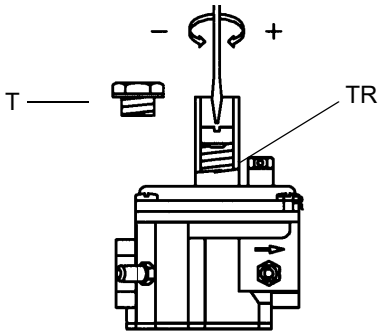
2 rotate clockwise the nut 1 as shown in to close the valve or counterclockwise to open.

To perform gas pressure adjustment, act on the pressure governor as follows (see next picture):

3 remove the cap **T**: to increase the gas pressure at the outlet use a screwdriver on the screw **TR** as shown in the next picture. Screw to increase the pressure, unscrew to decrease; once the regulation is performed, replace cap **T**.



Brahma gas valve EGRx12



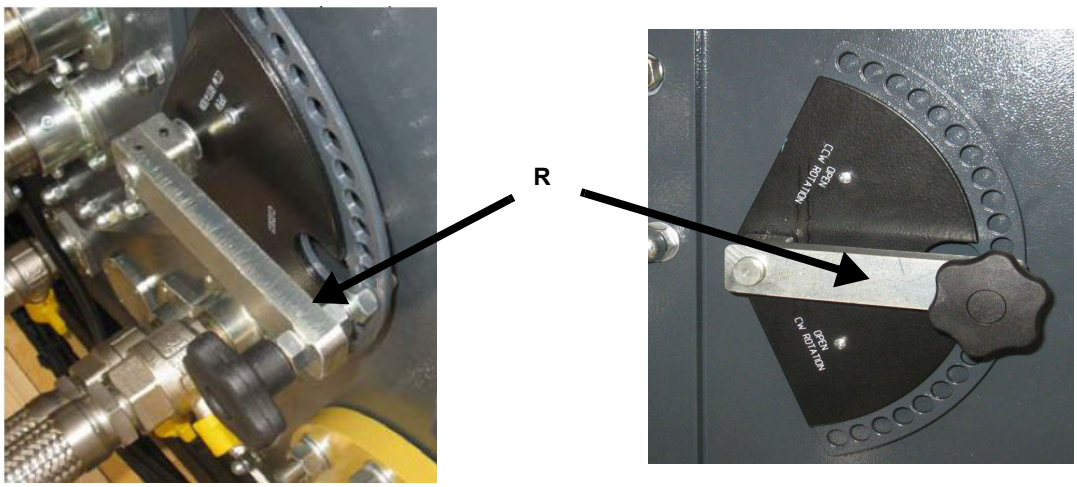
Gas pressure governor

Adjusting the air register

If necessary, adjust the air register, by moving the R selector:

- central position: register closed.
- counterclockwise rotation (CCW): the flame rotates couterclockwise
- clockwise rotation (CW):the flame rotates clockwise

Note: the more the register is opened, the more the flame rotate and enlarge itself



Attention! if it is necessary to change the register position, repeat the air and gas adjustments described above.

PART IV: MAINTENANCE

At least once a year carry out the maintenance operations listed below. In the case of seasonal servicing, it is recommended to carry out the maintenance at the end of each heating season; in the case of continuous operation the maintenance is carried out every 6 months.

WARNING: ALL OPERATIONS ON THE BURNER MUST BE CARRIED OUT WITH THE MAINS DISCONNECTED AND THE FUEL MANAUL CUTOFF VALVES CLOSED!

ATTENTION: READ CAREFULLY THE "WARNINGS" CHAPTER AT THE BEGINNIG OF THIS MANUAL.

ROUTINE MAINTENANCE

- Clean and examine the gas filter cartridge and replace it if necesssary;
- Remove and clean the combustion head;
- Examine and clean the ignition electrodes, adjust and replace them if necessary;
- Examine and clean the detection electrode/photoelement (according to the burner models), replace it if necessary, in case of doubt, check the detection circuit, after the burner start-up;
- Clean and grease leverages and rotating parts.

ATTENTION: when servicing, if it was necessary to disassemble the gas train parts, remember to execute the gas proving test, once the gas train is reassembled, according to the procedure imposed by the law in force.

Gas filter maintenance

ATTENTION: Before opening the filter, close the manual cutoff valve downstream the filter and bleed the gas; check that inside the filter there is no pressurised gas.

To clean or remove the filter, proceed as follows:

1 remove the cap unscrewing the fixing screws (A);
2 remove the filtering cartridge (B), clean it using water and soap, blow it with compressed air(or replace it, if necessary)
3 replace the cartridge in its proper position taking care to place it inbetween the guides as not to hamper the cap replacement;
4 be sure to replace the "O" ring into its place (C) and replace the cover fastening by the proper screws (A).

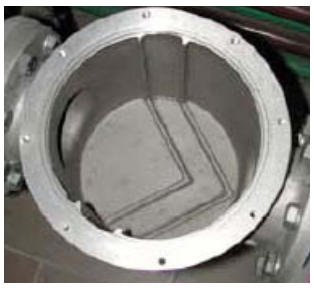
A



B



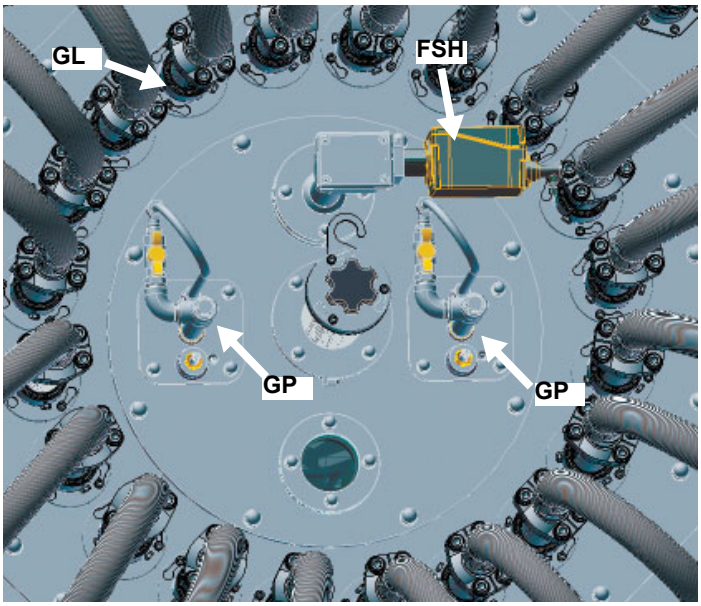
C



Removing the combustion head

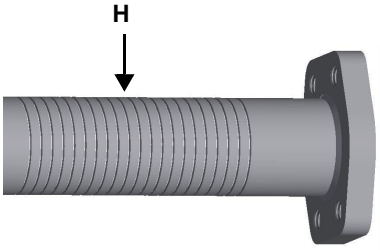
- Check the gas lances positioning on their reference, in order to re-establish the same positioning later
- Close the manual valves (MV) at the gas flexible hoses inlet
- Remove the gas pilot (GP) after having disconnected the flexible hoses.
- Remove the gas lances (GL) after having disconnected the flexible hoses
- Remove all the electrical connections.
- Remove the flame detector out of its holder (FSH)
- Loosen the (V) screws that fasten the top plate P
- Remove the top plate (P) and the gas pilot (the operation is simplified by the internal support with guide)
- Clean the combustion head by means of a vacuum cleaner; scrape off the scale by means of a metallic brush.

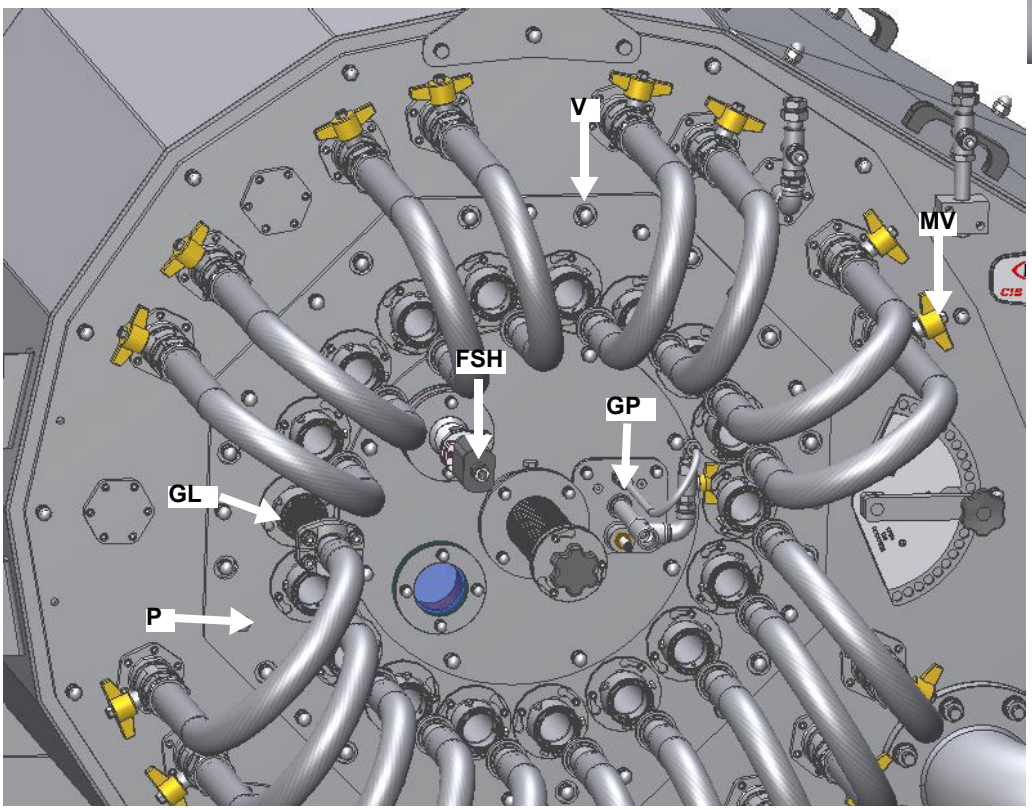
To assemble the combustion head, reverse the operations described bove



Keys

FSH flame scanner holder
GP Gas pilot
GL Gas lances
MV manual valve
P top plate
V screws
H lance reference ring





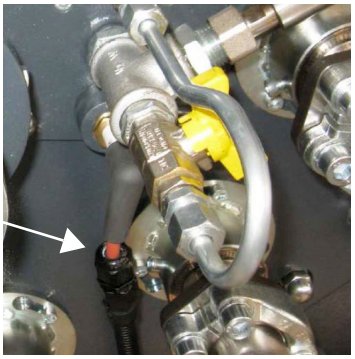
ATTENTION: to assemble the combustion head, reverse the operation described above.

To reassemble the gas lances, pay attention to insert them in the same position as before, checking the references H on the operator side top plate (P)

Replacing the ignition electrode

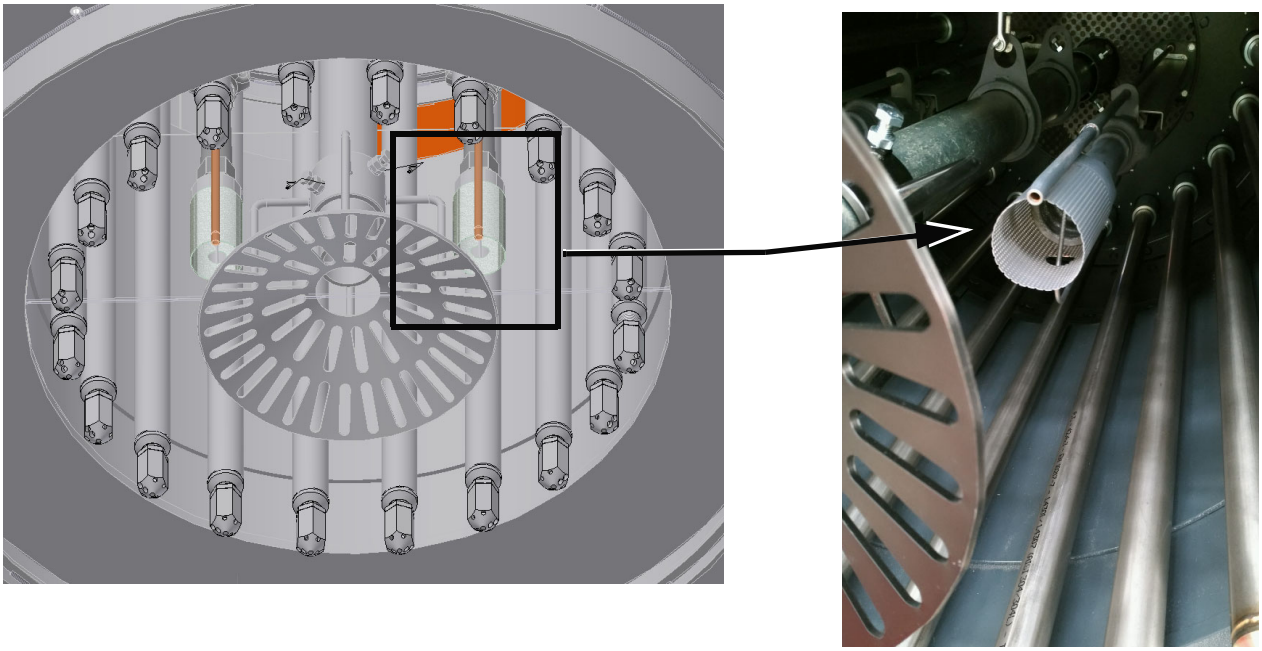
ATTENTION: avoid the electrode to get in touch with metallic parts (blast tube, head, etc.), otherwise the boiler operation would be compromised. Check the electrode position after any intervention on the combustion head.

EC



To replace the ignition electrode, proceed as follows:

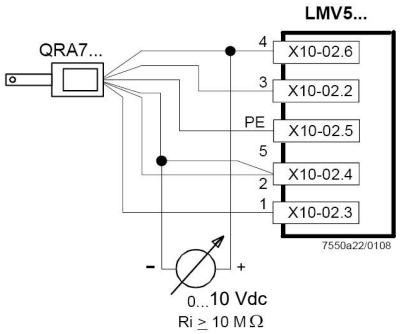
- disconnect the electrode cable (EC – see picture above)
- loose the screws that fasten the ignitor plate and remove the ignitor ass.y;
- loosen the screw that fixes the ignition electrode to the burner ignitor;
- remove the electrode and replace it.



Cleaning and replacing the flame detector

- Remove the detector from its seat (see picture);
- to clean the detector's lens, use a soft, clean cloth (free from oil and solvents);
- check wiring and all safety functions each time a flame detector has been replaced.
-

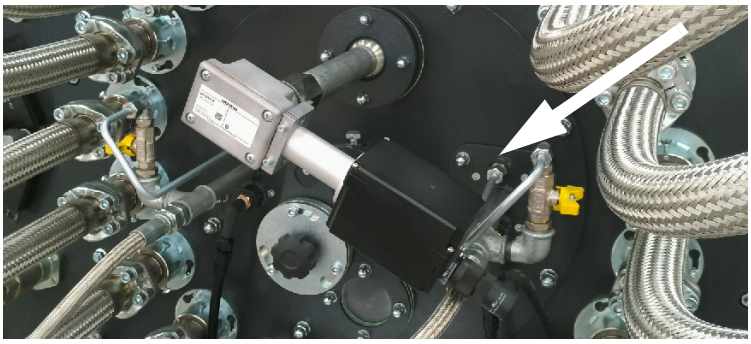
Control box	Minimum detection signal
LMV5	3.5 Vdc



Assignment of LMV5… terminals:

X10-02 pin 2	QRI... supply
X10-02 pin 3	L
X10-02 pin 4	N
X10-02 pin 5	PE
X10-02 pin 6	QRI... signal

Fig. 6



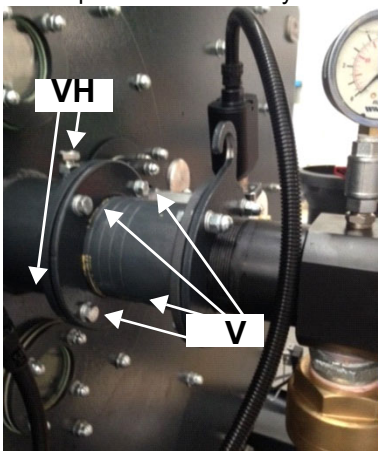


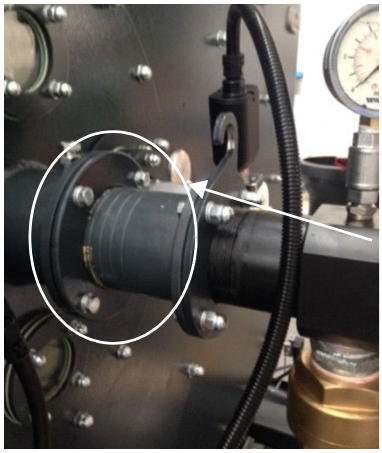
Only if necessary, change the combustion head position

To move the combustion head backwards or forwards, proceed as following:

- loose the two screws VH
- loose the four screws VB
- set the position head moving it backwards or forwards.
-

  Once it is set, fasten the screws V and VH.
- The head position is shown by the number of the notches below:





Head position notches (default setting)

WARNING: When moving the combustion head backwards be careful about the position of the electrode support (ES)

Attention! if it is necessary to change the head position, repeat the air and oil adjustments described above.

Seasonal stop

To stop the burner in the seasonal stop, proceed as follows:

1 turn the burner main switch to 0 (Off position)
2 disconnect the power mains
3 close the fuel valve of the supply line

Burner disposal

In case of disposal, follow the instructions according to the laws in force in your country about the “Disposal of materials”.

Wiring diagrams attached 14-0076/2

TROUBLESHOOTNG GUIDE Gas operation

BURNER DOESN'T LIGHT	* No electric power supply	* Restore power supply
	* Main switch open	* Close switch
	* Thermostats open	* Check set points and thermostat connections
	* Bad thermostat set point or broken thermostat	* Reset or replace the thermostat
	* No gas pressure	* Restore gas pressure
	* Safety devices (manually operated safety thermostat, pressure switches and so on) open	* Restore safety devices; wait till boiler reaches operating temperature then check safety device functionality.
	* Broken fuses	* Replace fuses. Check current absorption
	* Fan thermal contacts open (three phases motors only)	* Reset contacts and check current absorption
	* Burner control lock out	* Reset and check its functionality
	* Burner control damaged	* Replace burner control
GAS LEAKAGE: BURNER LOCKS OUT (NO FLAME)	* Gas flow is too low	* Increase the gas flow * Check gas filter cleanness * Check butterfly valve opening when burner is starting (only Hi-Low flame and progressive)
	* Ignition electrodes discharge to ground because dirty or broken	* Clean or replace electrodes
	* Bad electrodes setting	* Check electrodes position referring to instruction manual
	* Electrical ignition cables damaged	* Replace cables
	* Bad position of cables in the ignition transformer or into the electrodes	* Improve the installation
	* Ignition transformer damaged	* Replace the transformer
BURNER LOCKS OUT WITH FLAME PRESENCE	* Wrong setting of flame detector	* Adjust flame detector
	* Flame detector damaged	* Replace flame detector
	* Bad cables of flame detector	* Check cables
	* Burner control damaged	* Replace burner control
	* Phase and neutral inverted	* Adjust connections
	* Ground missing or damaged	* Check ground continuity
	* Voltage on neutral	* Take off tension on neutral
	* Too small flame (due to not much gas)	* Adjust gas flow * Check gas filter cleanness
	* Too much combustion air	* Adjust air flow rate
only FOR LME22: BURNER CONTINUES TO PERFORM ALL ITS FEATURES WITHOUT IGNITING THE BURNER	* Air pressure switch damaged or bad links	* Check air pressure switch functions and links
	* Burner control damaged	* Replace burner control
BURNER LOCKS OUT WITHOUT ANY GAS FLOW	* Gas valves don't open	* Check voltage on valves; if necessary replace valve or the burner control * Check if the gas pressure is so high that the valve cannot open
	* Gas valves completely closed	* Open valves
	* Pressure governor too closed	* Adjust the pressure governor
	* Butterfly valve closed	* Open the butterfly valve
	* Maximum pressure switch open.	* Check connection and functionality
	* Air pressure switch doesn't close the NO contact	* Check connections * Check pressure switch functionality
THE BURNER IS BLOCKED AND THE EQUIPMENT PROVIDES A LOCK CODE "CAUSE AIR PRESSURE SWITCH FAULT"	* Air pressure switch damaged (it keeps the stand-by position or badly set)	* Check air pressure switch functionality * Reset air pressure switch
	* Air pressure switch connections wrong	* Check connections
	* Air fan damaged	* Replace motor
	* No power supply	* Reset power supply
	* Air damper too closed	* Adjust air damper position
BURNER LOCKS OUT DURING NORMAL RUNNING	* Flame detector circuit interrupted	* Check wiring * Check photocell
	* Burner control damaged	* Replace burner control
	* Maximum gas pressure switch damaged or badly set	* Reset pressure switch or replace it
THE BURNER STARTS AND AFTER A WHILE IT REPEATS THE STARTING CYCLE.	* Gas pressure switch badly set	* Reset the pressure switch
	* Gas filter dirty	* Clean gas filter
	* Gas governor too low or damaged	* Reset or replace the governor
BURNER STANDS WHILE RUNNING WITHOUT ANY SWITCHING OF THERMOSTATS	* Thermal contacts of fan motor open	* Reset contacts and check values * Check current absorption
FAN MOTOR DOESN'T START	* Internal motor wiring broken	* Replace wiring or complete motor
	* Fan motor starter broken	* Replace starter
	* Fuses broken (three phases only)	* Replace fuses and check current absorption
BURNER DOESN'T SWITCH TO HIGH FLAME	* Hi-low flame thermostat badly set or damaged	* Reset or replace thermostat
	* Servomotor cam badly set	* Reset servomotor cam
***mechanical only*: SOMETIMES THE SERVOMOTOR RUNS IN THE WRONG WAY**	* Servomotor capacitor damaged	* Replace capacitor
PHASE-TO-PHASE SUPPLY OR PRESENCE OF VOLTAGE ON NEUTRAL*	* Lights up and freezes	* In such cases, insert an RC circuit (our code 2531003).



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Note: specifications and data subject to change. Errors and omissions excepted.

RECOMMENDATIONS FOR LMV5x CONNECTIONS

Connections affected by EMC noises are related to the bus cable (actuator line cable, PLL52), detection probe cable, speed sensor cable, 4-20mA signal cable that controls the VSD.

Input and power cables (400V e 230V) must be laid separately from the signal cables.

The bus cable between control panel and burner and between burner and PLL52 board (used when O2 trim control must be perfomed) must be laid separately and far from power cables.
When long cables must be provided, it is recommended to put the bus cable into a pipe or a metallic sheath: the sheath ends must be grounded with suitable rings.

Provide a shielded three-pole cable type FG7OH2R+T (see Annex 1), between VSD and motor; earth must be outside the shielding.

Shielding must get to the lower part of the VSD and get to the motor junction box.
Shielding must be connected to the equipotential ground on both ends, better with suitable rings.
Otherwise, a standard cable can be used also but put inside a pipe or metallic sheath (the sheath ends must be grounded with suitable rings) and an earth external wire for the motor ground.

The cable for the 4÷20mA signal that controls the VSD, must be shielded, only LMV5x side ends connected to the equipotential terminal. If the VSD is not inside the control panel, the cable must be laid separately inside a metallic sheath earthed by means of rings.

As for the speed sensor cable and QRI detection probe cable, provide a “Ethernet “ cat.5 or 6 cable, inside a metallic sheath (with ends earthed by means of rings) and laid separately from the motor cable.
As the sensor uses three wires, divide and twist the pairs to avoid noises.
Alternatively, provide a 3x2x0,50 twisted cable Liycy type (see Annex 2).

In case of O2 trim control version, O2 probe and PLL52 board must be connected by means of a 3x2x0,50 twisted cable Liycy type (see Annex 2).

NB: *when a shielding has both ends wired to Earth, be sure they are at the same potential. If there is any Voltage difference, ground just one of the two ones, generally the one closest to the weakest, respect to EMC, component. Anyway give way to the burner control, that is wire to ground the end of the shielding closest to the LMV.*
For instance, the cable between LMV and VSD, if the shielding has only one end wired to Earth, this one has to be the one LMV side.

Annex1 – Example for motor cable

INDUSTRIA E AUTOMAZIONE

FG70H2R+T 0,6/1 kV
A RIDOTTA EMISSIONE DI ALOGENI

FG70H2R+T 0,6/1 kV
WITH REDUCED HALOGEN EMISSION



CARATTERISTICHE TECNICHE

Colore delle anime:		UNEL 00722 / VDE 0293 (Tab. 8)
Conduttori:	rame rosso elettrolitico	normativa CEI EN 60228 Cl.5 (Tabella 9)
Isolante:	elastomero silanico di qualità G7	normativa CEI 20-11 - CEI EN 50363
Separatore:	nastro poliestere-mylar	
Schermatura:	a treccia capillari di rame rosso elettrolitico cop. > 80 %	
Guaina esterna:	PVC di qualità TM2	normativa CEI 20-11 - CEI EN 50363
Colore della guaina:	Grigio RAL 7035	
Prova N.P. verticale:	su singolo conduttore o cavo isolato	normativa CEI EN 60332-1-2
Prova GAS emessi:	durante la combustione	normativa CEI EN 50267-2-1
Resistenza agli olii:		normativa CEI 20-34/0-1
Prova N.P.I.:		normativa CEI 20-22/2
Resistenza elettrica:	relativamente alla sezione	normativa CEI EN 60228 (Tabella 9)
Tens. nominale Uo/U:	0,6/1 kV	
Tensione di prova:	4000 V	
Temperatura d'esercizio:	(- 25 °C ÷ + 90 °C)	
Temperatura di corto circuito:	250 °C	
Marcatura:	BERICA CAVI S.P.A. (VI) FG70H2R + T 0,6/1 kV O.R. CEI 20-22 II CE Anno/Lotto - N° Anime x Sezione + T	
Raggio di curvatura:	minimo 15 volte diametro esterno	

TECHNICAL FEATURES

Cores colour code:		*UNEL 00722 / VDE 0293 (Tab. 8)*
Conductors :	*fine wires stranded of bare copper*	*CEI EN 60228 Cl.5 (Tab.9) rule*
Insulation:	*G7 quality rubber*	*CEI 20-11 - CEI EN 50363 rules*
Assembling:	*polyester-mylar tape*	
Shield:	*bare copper braid 80% covering*	
Outer sheath:	*TM2 quality PVC*	*CEI 20-11 - CEI EN 50363 rules*
Sheath colour code:	*Grey RAL 7035*	
Vertical fire retardant test:	*on single conductor or insulated cable*	*CEI EN 60332-1-2 rule*
Emission GAS test:	*during the combustion*	*CEI EN 50267-2-1 rule*
Oil resistant test:		*CEI 20-34/0-1 rule*
Flame retardant test:		*CEI 20-22/2 rule*
Electric resistance:	*according to*	*CEI EN 60228 (Tab. 9)*
Working voltage:	*0,6/1 kV*	
Testing voltage:	*4000 V*	
Working temperature:	*(-25 °C ÷ +90 °C)*	
Short circuit temperature:	*250 °C*	
Outer printing:	*BERICA CAVI S.P.A. (VI) FG70H2R + T 0,6/1 kV O.R. CEI 20-22 II CE - Year/Lot - Nr. of cond. by cross sect. + T.*	
Bending radius:	*cable outer diameter x 15*	

FG70H2R+T 0,6/1 kV
A RIDOTTA EMISSIONE DI ALOGENI

FG70H2R+T 0,6/1 kV
WITH REDUCED HALOGEN EMISSION

TIPO *TYPE*	Ø ESTERNO MEDIO *MEDIUM Ø OUTER*	PESO MEDIO *MEDIUM WEIGHT*	CODICE PRODOTTO *ITEM CODE*
n° x mm²	mm	kg x km	
3x1,5 + 1G1,5	10,8	173,0	B5803150
3x2,5 + 1G2,5	12,6	254,0	B5803250
3x4 + 1G4	15,3	365,0	B5803400
3x6 + 1G6	17,4	497,0	B5803600
3x10 + 1G10	20,6	730,0	B58031000
3x16 + 1G16	24,8	1095,0	B58031600
3x25 + 1G25	30,1	1680,0	B58032500

TIPO *TYPE*	Ø ESTERNO MEDIO *MEDIUM Ø OUTER*	PESO MEDIO *MEDIUM WEIGHT*	CODICE PRODOTTO *ITEM CODE*
n° x mm²	mm	kg x km	

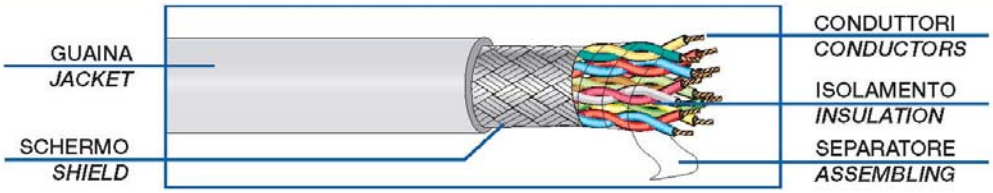
Annex 2 – Example for sensor cable

CAVI TIPO "Li-YCY-P"
A COPPIE SCHERMATI A TRECCIA

IMPIEGO: Cavi schermati per segnali e trasmissione dati per applicazioni in elettronica ed informatica, efficaci contro le interferenze elettromagnetiche ed atti ad offrire una protezione contro influenze capacitive dovute a campi elettrici.

CABLES TYPE "Li-YCY-P"
TWISTED PAIRS, TINNED COPPER BRAID SHIELD

STANDARD USE: Signal and data transmission shielded cables for electronics and information technology applications, effective against electromagnetic interferences and suited to offer protection against capacitive influences due to electric fields.



CARATTERISTICHE TECNICHE		TECHNICAL FEATURES
CONDUTTORI: Flessibili in rame rosso sec. CEI 20-29 (IEC 228) Cl. 5, VDE 0295 Cl. 5, NF C32-013 (0,34 mm² : VDE 0295 Cl.2)		***CONDUCTORS:*** *Flexible bare copper conductors* *CEI 20-29 (IEC 228) Cl. 5, VDE 0295 Cl. 5,* *NF C32-013 Ref. (0,34 mm² : VDE 0295 Cl.2)*
ISOLANTE: Polivinilcloruro (PVC) Sec. CEI 20-11 Cl. R2, VDE 0207 Cl. YI2 Codici colori: a norma DIN 47100		***INSULATION:*** *Polyvinylchloride (PVC)* *CEI 20-11 Cl. R2, VDE 0207 Cl. YI2 Ref.* *Colour code according to DIN 47100*
SEPARATORE: Nastro di poliestere		***ASSEMBLING:*** *Polyester tape helically wound*
SCHERMATURA: A treccia di rame stagnato Cordina di continuità a richiesta		***SHIELD:*** *Tinned copper braid* *On request with drain wire*
GUAINA ESTERNA: Polivinilcloruro (PVC) Sec. CEI 20-20 Cl. TM2, VDE 0207 Cl. YM2 colore: grigio (diverso a richiesta)		***JACKET:*** *Polyvinylchloride (PVC)* *CEI 20-20 Cl. TM2, VDE 0207 Cl. YM2 Ref.* *colour: grey or on request*
RESISTENZA ELETTRICA DEI CONDUTTORI: 0,14 mm²: <148 Ohm/Km 0,25 mm²: <79 Ohm/Km 0,34 mm²: <55 Ohm/Km 0,50 mm²: <39 Ohm/Km 0,75 mm²: <26 Ohm/Km 1mm²: <19,5 Ohm/Km		***ELECTRICAL CONDUCTOR RESISTANCE:*** *0,14 mm²: <148 Ohm/Km* *0,25 mm²: <79 Ohm/Km* *0,34 mm²: <55 Ohm/Km* *0,50 mm²: <39 Ohm/Km* *0,75 mm²: < 26 Ohm/Km* *1 mm²: <19,5 Ohm/Km*
TEMPERATURA DI ESERCIZIO: posa fissa: -25°C + 70°C posa mobile: -15°C + 70°C		***WORKING TEMPERATURE:*** *fixed installation: -25°C + 70°C* *flexing: -15°C + 70°C*
RAGGIO DI CURVATURA: 15 volte il diametro del cavo		***BENDING RADIUS:*** *15 times overall diameter of cable*
TENSIONE DI ESERCIZIO: 250 V		***WORKING VOLTAGE:*** *250 V*
TENSIONE DI PROVA: 1500 V		***TEST VOLTAGE:*** *1500 V*

CAVI TIPO "Li-YCY-P"
A COPPIE SCHERMATI A TRECCIA

CABLES TYPE "Li-YCY-P"
TWISTED PAIRS, TINNED COPPER BRAID SHIELD

PROVA N.P. FIAMMA:
Standard: sec. CEI 20-35 (IEC 332.1)
A richiesta: sec. CEI 20-22 II (IEC 332.3A)



FLAME RETARDANT TEST:
Standard: CEI 20-35 (IEC 332.1) Ref.
On request: CEI 20-22 II (IEC 332.3A) Ref.

IMPEDENZA DI TRASFERIMENTO:
max 200 mohm/m (f<10MHz)



SURFACE TRANSFER IMPEDANCE:
max 200 mohm/m (f<10MHz)

CAPACITA' DI LAVORO:
cond/cond: 120 nF/km (nom.)
cond/sch: 180 nF/km (nom.)



CAPACITANCE:
cond/cond: 120 nF/km (nom.)
cond/shield: 180 nF/km (nom.)

CODICE *CODE*	FORMAZIONE *TYPE*	ø esterno medio *outer diameter ø*	Peso medio Kg/Km *Medium weight Kg/Km*
28.204.1.02.1.000	2x2x0.14	5.6	40.0
28.204.1.03.1.000	3x2x0.14	5.9	47.0
28.204.1.04.1.000	4x2x0.14	6.2	61.0
28.204.1.05.1.000	5x2x0.14	7.2	68.0
28.204.1.06.1.000	6x2x0.14	7.6	76.0
28.204.1.07.1.000	7x2x0.14	7.6	82.0
28.204.1.08.1.000	8x2x0.14	8.4	90.0
28.204.1.10.1.000	10x2x0.14	9.8	118.0
28.204.1.12.1.000	12x2x0.14	10.2	130.0
28.204.1.16.1.000	16x2x0.14	11.2	160.0
28.204.1.18.1.000	18x2x0.14	11.7	186.0
28.204.1.20.1.000	20x2x0.14	12.4	200.0
28.204.1.25.1.000	25x2x0.14	14.0	273.0

CODICE *CODE*	FORMAZIONE *TYPE*	ø esterno medio *outer diameter ø*	Peso medio Kg/Km *Medium weight Kg/Km*
28.204.1.02.4.000	2x2x0.34	7.3	68.0
28.204.1.03.4.000	3x2x0.34	7.8	82.0
28.204.1.04.4.000	4x2x0.34	8.6	96.0
28.204.1.05.4.000	5x2x0.34	10.0	110.0
28.204.1.06.4.000	6x2x0.34	10.6	130.0
28.204.1.07.4.000	7x2x0.34	10.6	145.0
28.204.1.08.4.000	8x2x0.34	11.5	150.0
28.204.1.10.4.000	10x2x0.34	13.0	190.0
28.204.1.12.4.000	12x2x0.34	13.5	220.0
28.204.1.16.4.000	16x2x0.34	15.2	250.0
28.204.1.18.4.000	18x2x0.34	16.0	275.0
28.204.1.20.4.000	20x2x0.34	17.1	290.0
28.204.1.25.4.000	25x2x0.34	19.5	400.0

28.204.1.02.3.000	2x2x0.25	5.8	54.0
28.204.1.03.3.000	3x2x0.25	7.0	65.0
28.204.1.04.3.000	4x2x0.25	7.3	89.0
28.204.1.05.3.000	5x2x0.25	8.0	99.0
28.204.1.06.3.000	6x2x0.25	9.0	114.0
28.204.1.07.3.000	7x2x0.25	9.0	120.0
28.204.1.08.3.000	8x2x0.25	9.6	126.0
28.204.1.10.3.000	10x2x0.25	10.3	160.0
28.204.1.12.3.000	12x2x0.25	11.4	171.0
28.204.1.16.3.000	16x2x0.25	13.1	238.0
28.204.1.18.3.000	18x2x0.25	13.6	248.0
28.204.1.20.3.000	20x2x0.25	14.2	275.0
28.204.1.25.3.000	25x2x0.25	16.4	340.0

28.204.1.02.5.000	2x2x0.50	7.6	75.0
28.204.1.03.5.000	3x2x0.50	9.0	125.0
28.204.1.04.5.000	4x2x0.50	10.0	140.0
28.204.1.05.5.000	5x2x0.50	10.8	160.0
28.204.1.06.5.000	6x2x0.50	11.7	190.0
28.204.1.07.5.000	7x2x0.50	11.7	220.0
28.204.1.08.5.000	8x2x0.50	14.0	250.0
28.204.1.10.5.000	10x2x0.50	15.0	300.0
28.204.1.12.5.000	12x2x0.50	15.7	345.0
28.204.1.16.5.000	16x2x0.50	17.6	450.0

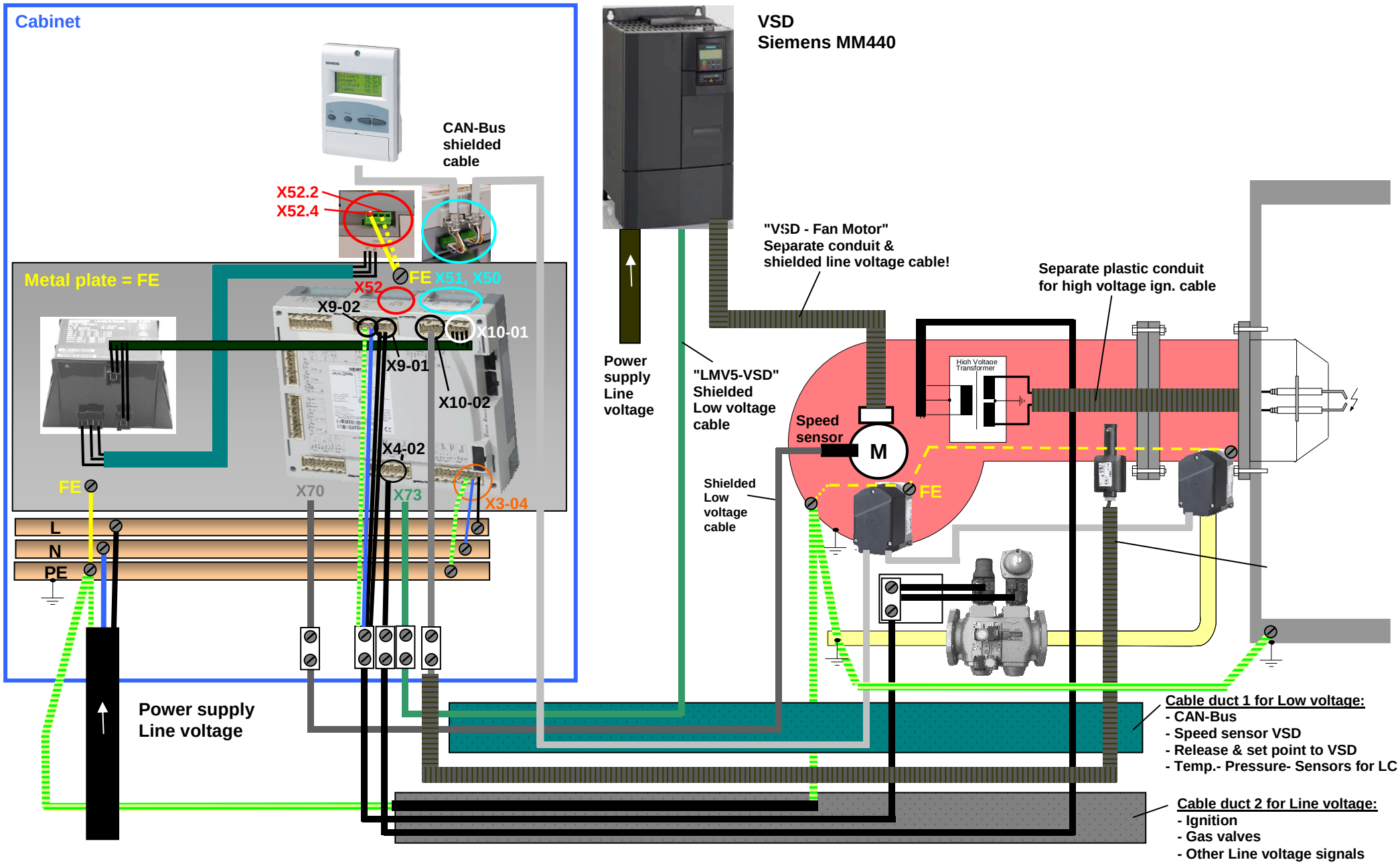
CAVI TIPO "Li-YCY-P"
A COPPIE SCHERMATI A TRECCIA

CABLES TYPE "Li-YCY-P"
TWISTED PAIRS, TINNED COPPER BRAID SHIELD

CODICE *CODE*	FORMAZIONE *TYPE*	ø esterno medio *outer diameter ø*	Peso medio Kg/Km *Medium weight Kg/Km*
28.204.1.02.6.000	2x2x0.75	8.6	103.0
28.204.1.03.6.000	3x2x0.75	9.0	128.0
28.204.1.04.6.000	4x2x0.75	10.6	167.0
28.204.1.05.6.000	5x2x0.75	12.0	215.0
28.204.1.06.6.000	6x2x0.75	12.8	240.0
28.204.1.07.6.000	7x2x0.75	12.8	265.0
28.204.1.08.6.000	8x2x0.75	14.6	306.0
28.204.1.10.6.000	10x2x0.75	16.0	355.0
28.204.1.12.6.000	12x2x0.75	17.0	405.0
28.204.1.16.6.000	16x2x0.75	20.5	565.0

CODICE *CODE*	FORMAZIONE *TYPE*	ø esterno medio *outer diameter ø*	Peso medio Kg/Km *Medium weight Kg/Km*
28.204.1.02.7.000	2x2x1	9.4	122.0
28.204.1.03.7.000	3x2x1	11.5	179.0
28.204.1.04.7.000	4x2x1	12.8	237.0
28.204.1.05.7.000	5x2x1	13.8	297.0

Appendix: Example for wiring, earthing and shielding the LMV5-System



Addendum 4: LMV52... with O2 trim control and O2 module

General

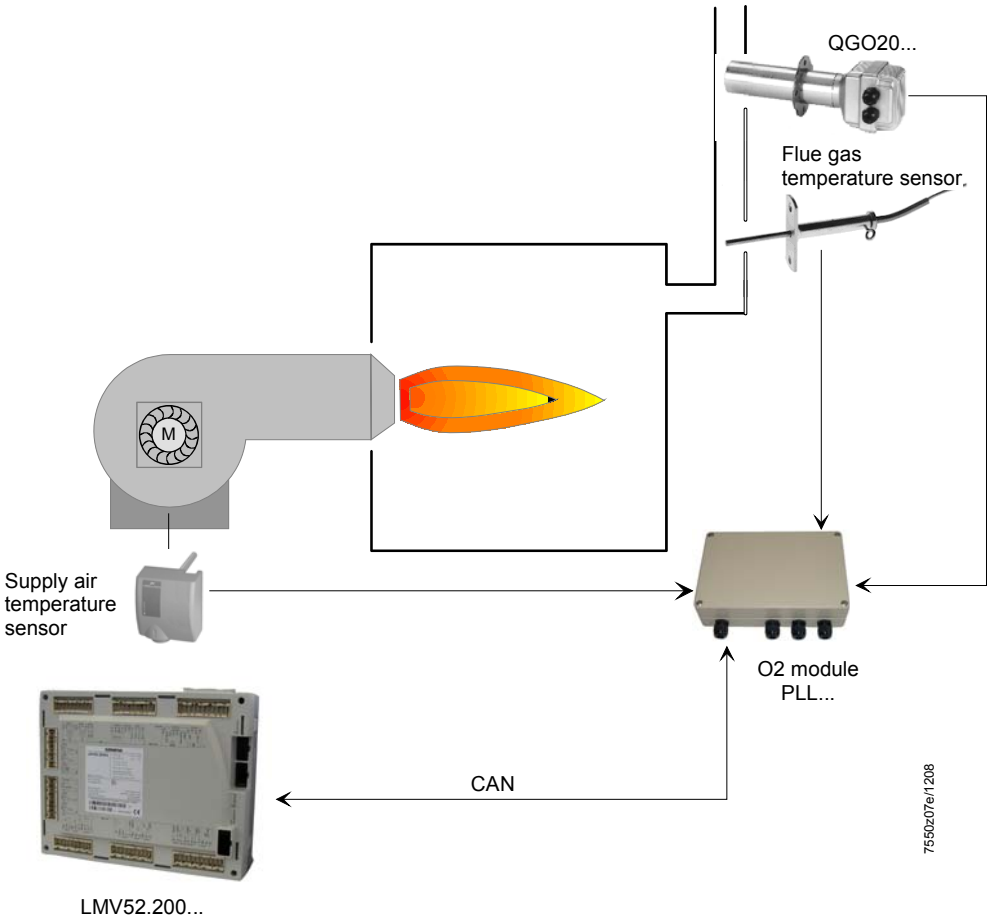
The LMV52... system is an extended LMV51... system. A special feature of the LMV52… is control of the residual oxygen content to increase the boiler's efficiency.

In addition to the features of the LMV51..., the LMV52... provides O2 trim control, control of a maximum of 6 actuators, control of a VSD, and acquisition of cumulated fuel consumption and current fuel throughput. The LMV52... system uses an O2 sensor (QGO20...), an external O2 module, and the standard components of the LMV51... system.

ATTENTION: for the proper burner adjustment, it is necessary to install a fuel meter for each burner.

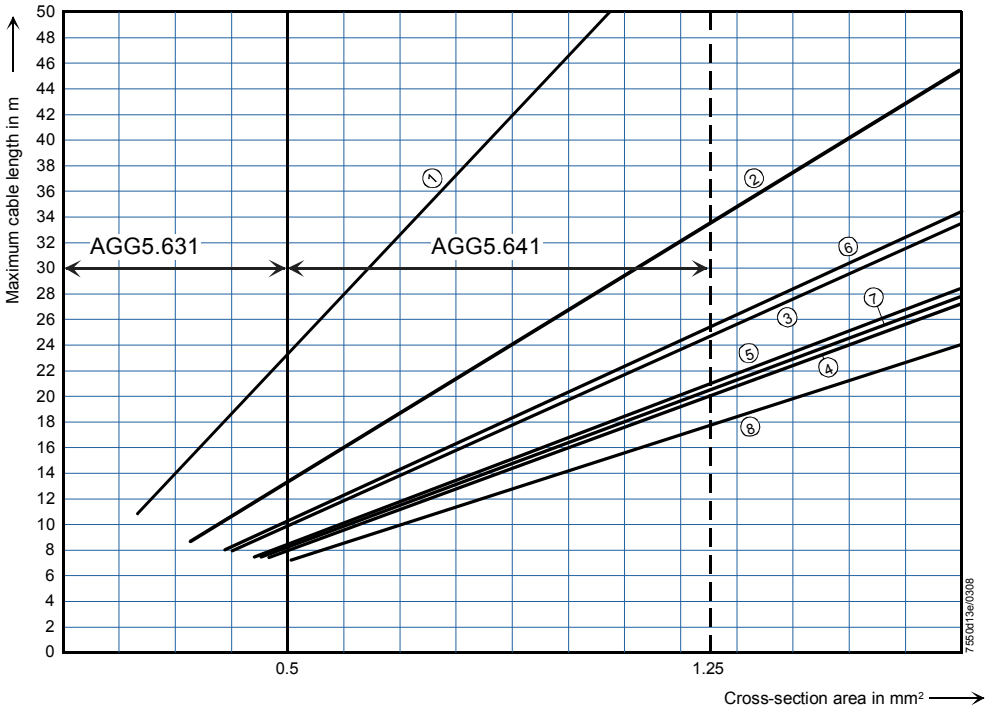
The PLL... O2 module is a detached measuring module for the QGO20... sensor and for 2 temperature sensors (Pt1000 / LG-Ni 1000). The module communicates with the LMV52… via CAN bus.

The fuel meters must be connected directly to the fuel-related inputs of the basic unit. On the AZL5... display and operating unit, the individual consumption values can be read out and the meter readings can be reset.



Determination of the maximum cable length

The maximum cable length between transformer and CAN bus users is dependent on the type of cable (cross-sectional area), the number of actuators and the type of actuator used (current).
The following graphs can be used to determine the maximum CAN bus cable lengths between the transformer and group of actuators or the AZL5…, depending on the relevant influencing factors.
The assumption was made that the actuators within the group are close to one another.
The **minimum** cross-sectional area for the system examples shown results from the start of the curve.
The **maximum** cable lengths for the defined system cables AGG5.641 and AGG5.631 result from the points of intersection in the graph.



AGG5.631 (cable type 2)
AGG5.641 (cable type 1)

① 1 x SQM45...
② 2 x SQM45...
③ 3 x SQM45...
④ 4 x SQM45...
⑤ 2 x SQM48...
⑥ 1 x SQM45... + 1 x SQM48...
⑦ 2 x SQM45... + 1 x SQM48...
⑧ 3 x SQM45... + 1 x SQM48...

CAN bus connection between transformer and actuator group



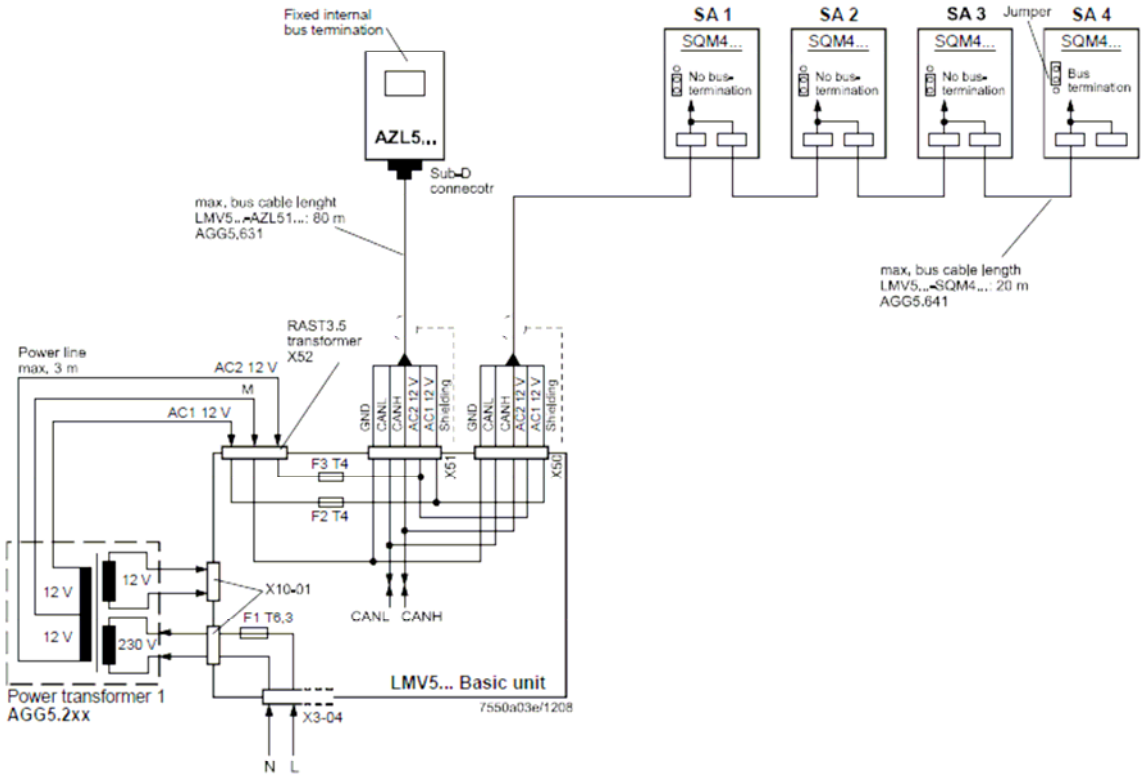
When connecting a PLL52... O2 module, the maximum permissible cable length of a network is to be reduced by 2 m.

Example: - System cable: AGG5.641 (connecting cable to the actuators)
- Actuators: 2 x SQM45...

The point of intersection of the vertical line for the AGG5.641 (1.25 mm^2) and curve ① (2 x SQM45...) gives a maximum cable length of 33.4 m between the transformer and the group of actuators.

Example 1

Installation of all components in the burner;
CAN bus cable «LMV5... →shielding last actuator » 20 m

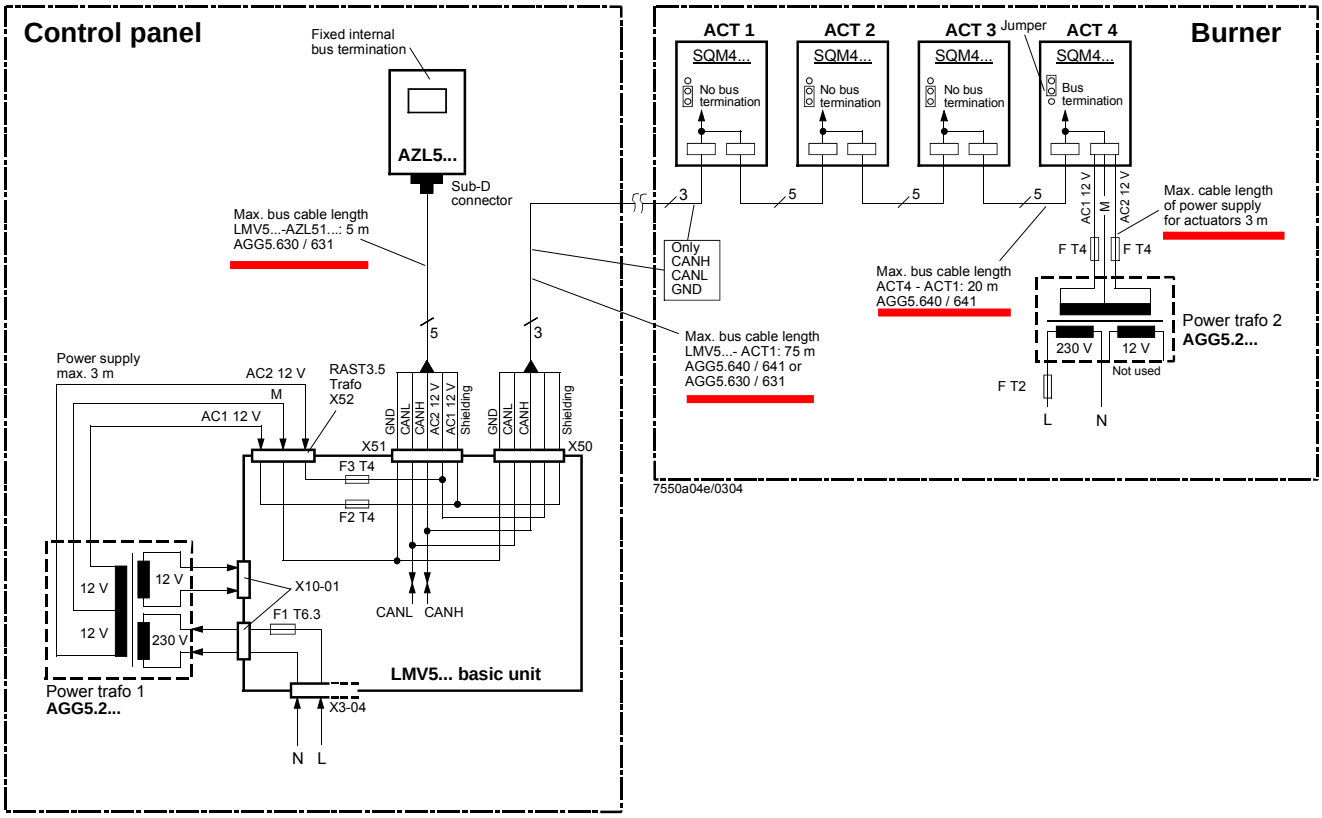


Note on example 1

Total length of CAN bus cable ≤ 100 m

Example 2

LMV5... basic unit in the control panel, actuator on the burner;
CAN bus cable «LMV5... → SA» > 20 m



Notes on example 2

Total length of CAN bus cable ≤ 100 m

Whenever the distance between the LMV5... and the last actuator exceeds 20 m, or if more than one SQM48 is used on the burner (refer to sizing chart “Determination of maximum cable length“), a second transformer is required for powering the actuators.

In that case, transformer 1 powers the LMV5... basic unit and the AZL5... display and operating unit (**Fig. 1**). Transformer 2 powers the actuators (**Fig. 2**).

With the CAN bus cable connections from the LMV5... (**Fig. 1**) to the first actuator (**Fig. 2**), the 2 voltages AC1 and AC2 on the LMV5... side must **not** be connected and only cables CANH, CANL and M (+shielding) are to be connected to the first actuator (**Fig. 2**).

In that case, the actuators must be powered by a second transformer which to be located near the actuators.

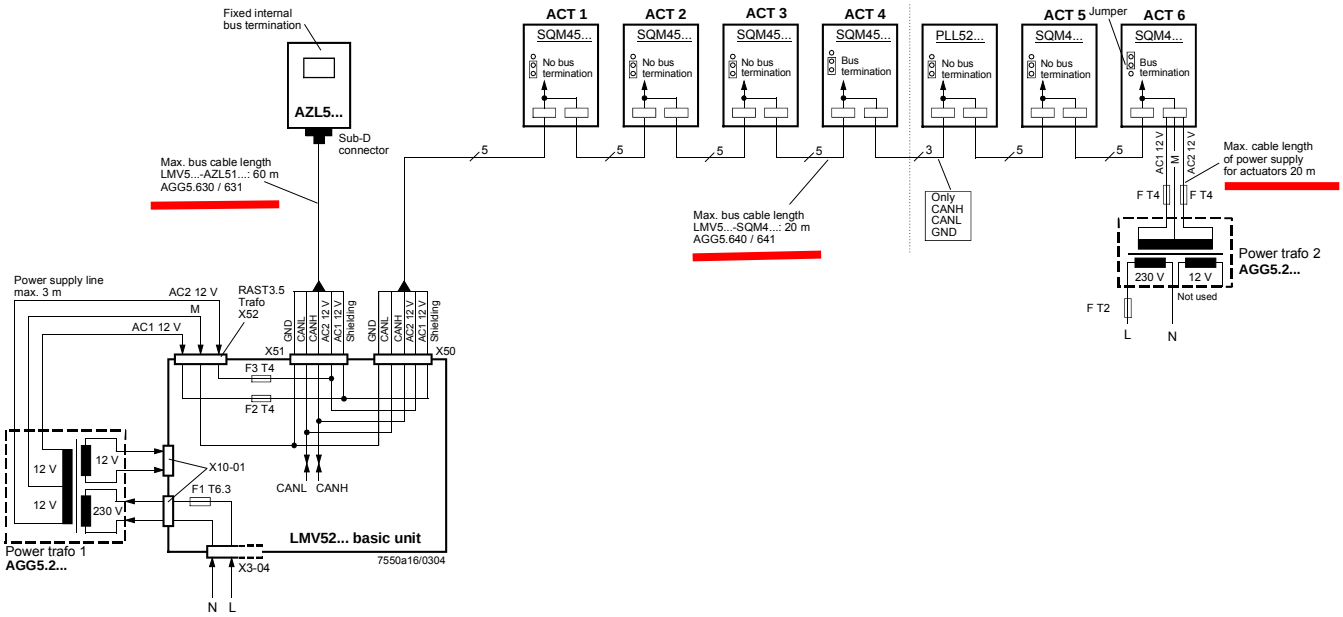
The power from that transformer (lines AC1, AC2, M) must be fed to the actuator (ACT4 in the example above) and then connected through via bus cable AGG5.640 (cable type 1) to all the other actuators.

The fuses required for transformer 1 are accommodated in the LMV5... basic unit.

For transformer 2, these 3 fuses must be located close to the transformer (for type, refer to Basic Documentation P7550).

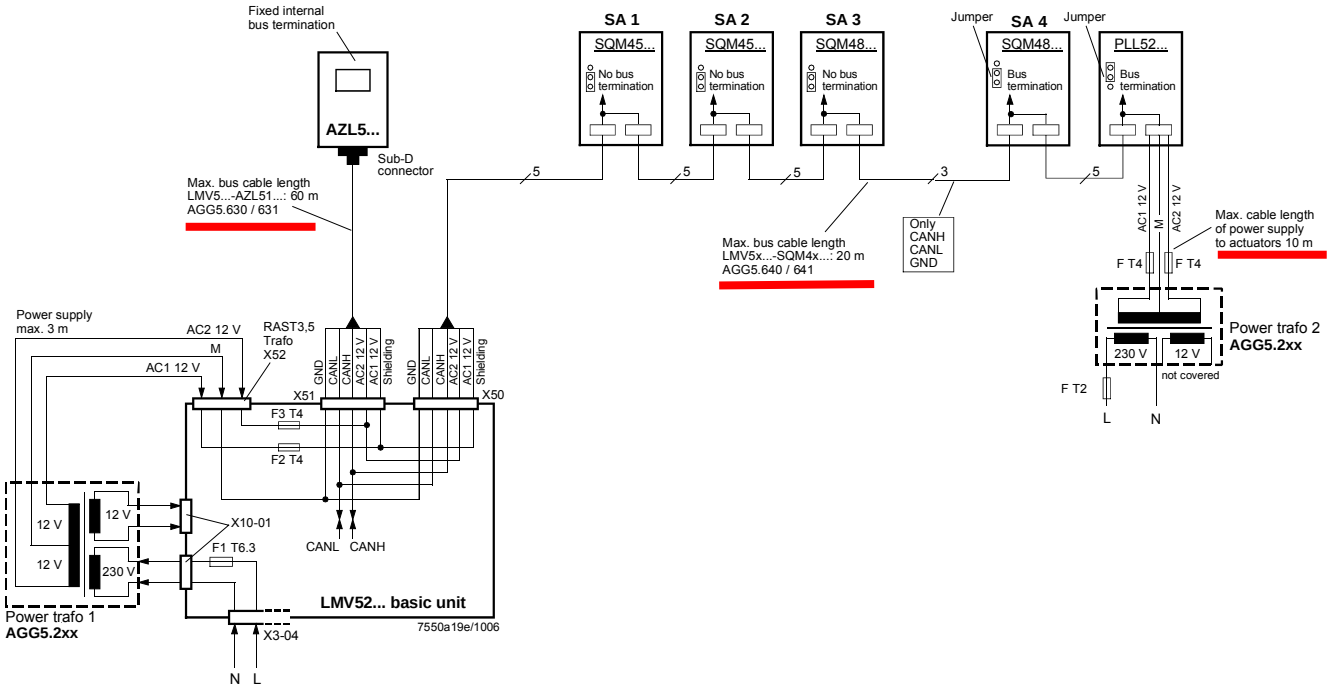
Example 3a

Installation of all components in the burner;
CAN bus cable «LMV52... ↔ SA» > 20 m with 6 actuators and O2 module PLL52...



Example 3b

Installation in the control panel, actuator on the burner;
CAN bus cable «LMV52... ↔ SA» > 25 m with 4 actuators and O2 module PLL52...



Notes on example 3a / 3b

CAN bus cable with LMV52... and more than 4 actuators and O2 module PLL52...

On LMV52... applications with more than 4 actuators (SQM45...), a second transformer is required for powering the extra actuators.

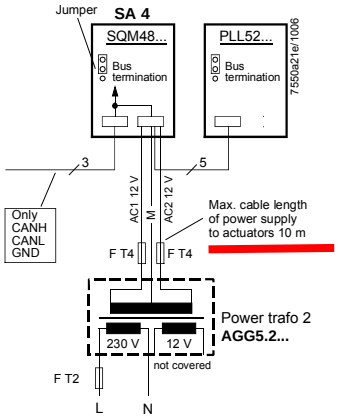
In that case, transformer 1 powers the LMV52... basic unit, the **AZL5...**, and the first 4 actuators.

Interrupt the connection between the components at a suitable location. On the actuator side, the 2 voltages AC1 and AC2 must **not** be connected but only lines «CANH, CANL and M» (+shield) to the O2 module and the other actuator.

In that case, the actuators (SA5, SA6) and the O2 module must be powered by a second transformer to be located near the actuators and the O2 module.

Connect the power supply line from that transformer to the O2 module PLL52… (in example 3a «SA6» / in example 3b «Auxiliary terminal) (lines AC1, AC2, M) and from there, via bus cable AGG5.640 (cable type 1), through to the second actuator (SA) and the O2 module.
The fuses required for transformer 1 are accommodated in the LMV52... basic unit.

Optionally, the supply voltage can also be delivered via a conduit box and fed into the connecting line between SA4 and PLL52…

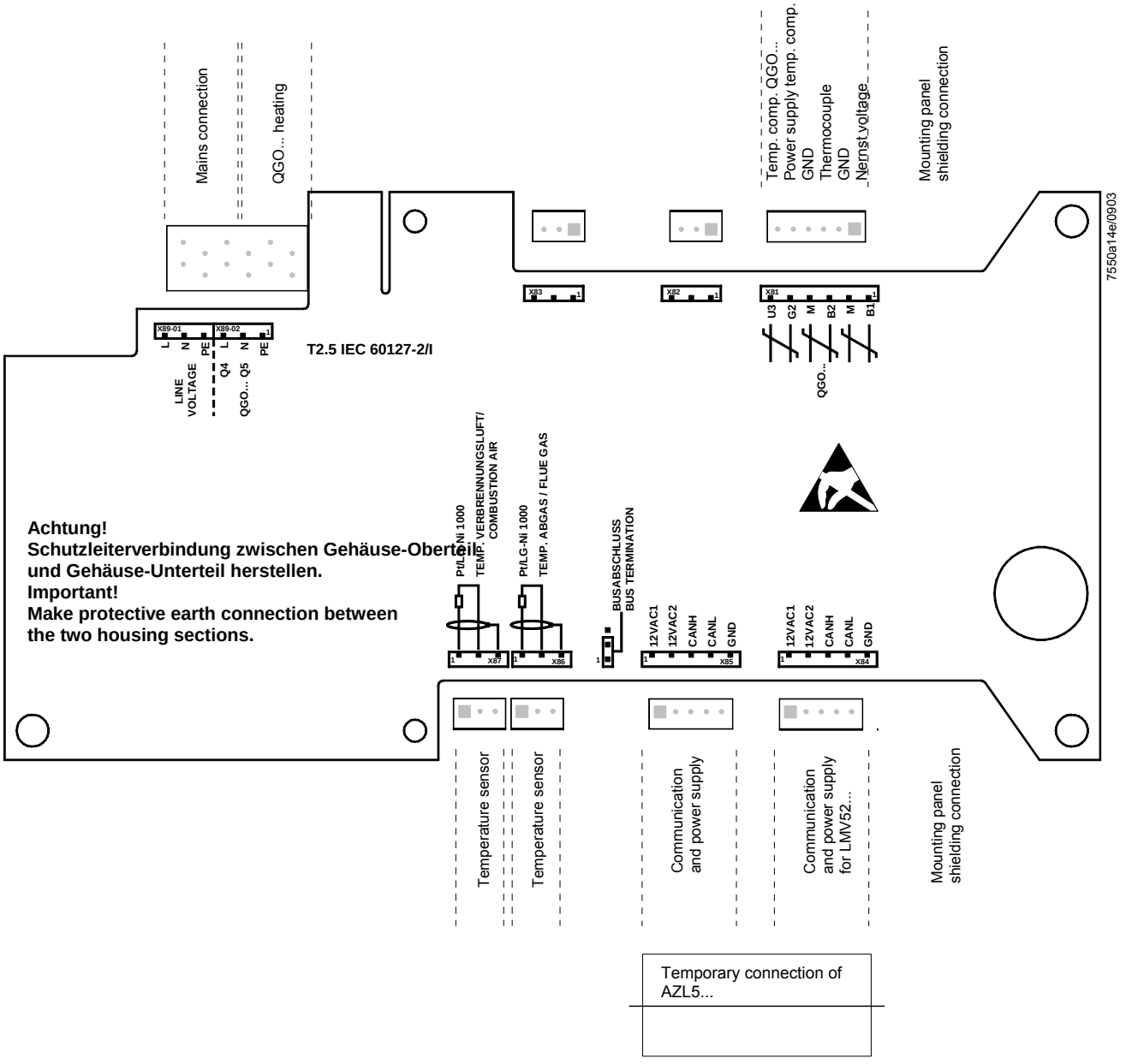


For transformer 2, the OEM must fit the 3 fuses close to the transformer.

O2 module

In comparison with the LMV51... system, the extra components to be connected with the LMV52… system are the O2 module and the O2 sensor QGO... and, optionally, the combustion air and flue gas temperature sensors. The O2 module is to be connected to the basic unit via the CAN bus. The O2 module must be located in the vicinity of the QGO... (< 10 m), aimed at keeping interference on the sensitive detector lines as low as possible. For sensor heating, the O2 module requires a separate mains connection facility.

18.8.1 Inputs and outputs

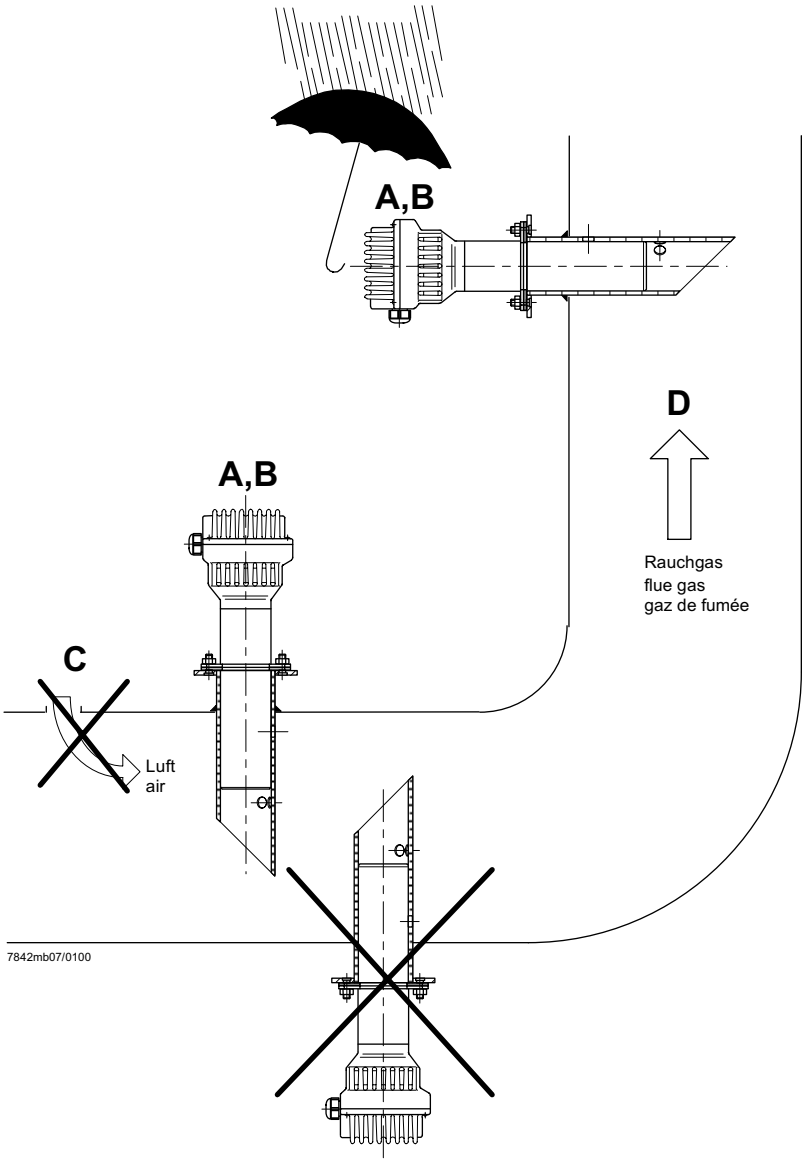


QGO20...

Montageanleitung
Mounting instruction
Instruction de montage
Monteringsanvisning
Montage-aanwijzing
Istruzioni di montaggio
Asennusohje
Instrucciones de montaje
Monteringsinstruktion
Montasjeanvisning



Fühler aus Keramik - zerbrechlich
Ceramic detector - fragile
Sonde en céramique - fragile



O2-Fühler QGO20... und Rauchgassammler AGO20...

Voraussetzungen für eine korrekte messtechnische Erfassung des O2-Gehaltes der Rauchgase:

A - QGO20... **nur** mit Rauchgassammler AGO20... einsetzen

B - Einbauort des QGO20... so nahe am Brenner wie möglich, in einem Bereich ohne Turbulenzen und Inhomogenitäten. Nicht direkt im Bereich von Klappen oder Bögen montieren. Idealer Abstand: 5 x Kamindurchmesser.

C - Zwischen Brenner und Fühler darf keine Luft in die Rauchgase gelangen.

D - Strömungsgeschwindigkeit 1...10 m/s. Rauchgastemperatur am Messort ⩽ 300°C

O2-detector type QGO20... and flue gas collector type AGO20...

Presupposition for the correct measurement of the O2 content of the flue gases:

A - Use QGO20... **only** with flue gas collector type AGO20...

B - Mounting position of the QGO as close as possible to the burner, in a homogenous area without any turbulences. Do not mount the QGO20... in the area of dampers or curves. Ideal distance: Five times the diameter of the stack.

C - No air must be allowed to join the flue gases on their way from the burner to the detector.

D - Flow velocity 1...10 m/s. Flue gas temperature at the measuring position ⩽ 300°C

Sonde O2 QGO20... et collecteur des gaz de fumée AGO20...

Conditions requises pour une détection correcte de la teneur en O2 des gaz de fumée:

A - Utiliser le QGO20... **exclusivement** avec le collecteur des gaz de fumée AGO...

B - Lieu de montage du QGO20... le plus près possible du brûleur, dans un domaine homogène sans turbulences. Ne pas le monter dans le domaine des clapets ou dans les courbes. Distance idéale: Cinq fois le diamètre de la cheminée.

C - Entre le brûleur et la sonde, il ne doit pas pénétrer d´air dans les gaz de fumée.

D - Vitesse d´ecoulement 1...10 m/s. Température des gaz fumée au lieu de la mesure ⩽ 300°C

Anschluss-Schema

6-adriges abgeschirmtes Kabel. Adern möglichst paarweise verdrillt. Abschirmung an Klemme GND des RPO... . Abschirmung nicht mit Schutzleiter oder M verbinden!

Anschlusskabel z.B.:

LifYCY LiYCY	6 x 2 x 0,20 / 22 oder 6 x 2 x 0,20

B1 (+) M (-)	Signal O2-Messzelle Masse für B1, B2
B2 (+) M (-)	Thermoelement-Spannung
U3 (+) G2 (-)	Signal Temperaturkompensations-element Speisung Temperaturkompensations-element
GND	Masse für Anschirmung

3 x 1,5 mm^2:

Q4	Fühlerheizung (AC 230 V)
Q5	Fühlerheizung (AC 230 V)

⏚ Erde*

Vorsicht bei den Anschlüssen U3 und G2!
Ein Fehlverdrahten der Anschlüsse führt zu einem Ausfall des Kompensationselementes.

* Am RPO... steht nur 1 Erdleiterklemme zur Verfügung. Beide Erdleiter müssen auf **eine** Klemme geführt werden.

Wiring diagram

Shielded 6-core cable. Wires should be twisted in pairs. Screen must be connected to terminal GND of the RPO... . Do not connect the shielding to the protective earth or M!

Connecting cable e.g.:

LifYCY LiYCY	6 x 2 x 0,20 / 22 or 6 x 2 x 0,20

B1 (+) M (-)	Signal from O2-measuring cell Ground for B1, B2
B2 (+) M (-)	Thermocouple voltage
U3 (+) G2 (-)	Signal from temperatue compensation element Power supply for temperature compensation element
GND	Ground for screening

3 x 1,5 mm^2:

Q4	QGO... detector heating (AC 230 V)
Q5	QGO... detector heating (AC 230 V)

⏚ Earth*

Caution when connecting U3 and G2!
Faulty wiring leads to failure of the compensation element.

* At the RPO..., there is only 1 earth terminal available. Both earth wires must be connected to **the same** earth terminal.

Schéma de raccordement

Câble blindé à 6 brins. Brins torsadés si possible par paires. Blindage sur la borne GND du RPO... . Ne pas connecter le blindage avec le conducteur de protection ou M!

Câble de raccordement p.ex.:

LifYCY LiYCY	6 x 2 x 0,20 / 22 ou 6 x 2 x 0,20

B1 (+) M (-)	Signal de la cellule de mesure d´O2 Masse pour B1, B2
B2 (+) M (-)	Tension de thermocouple
U3 (+) G2 (-)	Signal de l´élément de cpmpensation de température Alimentation de l´élément de compensation de température
GND	Masse du blindage

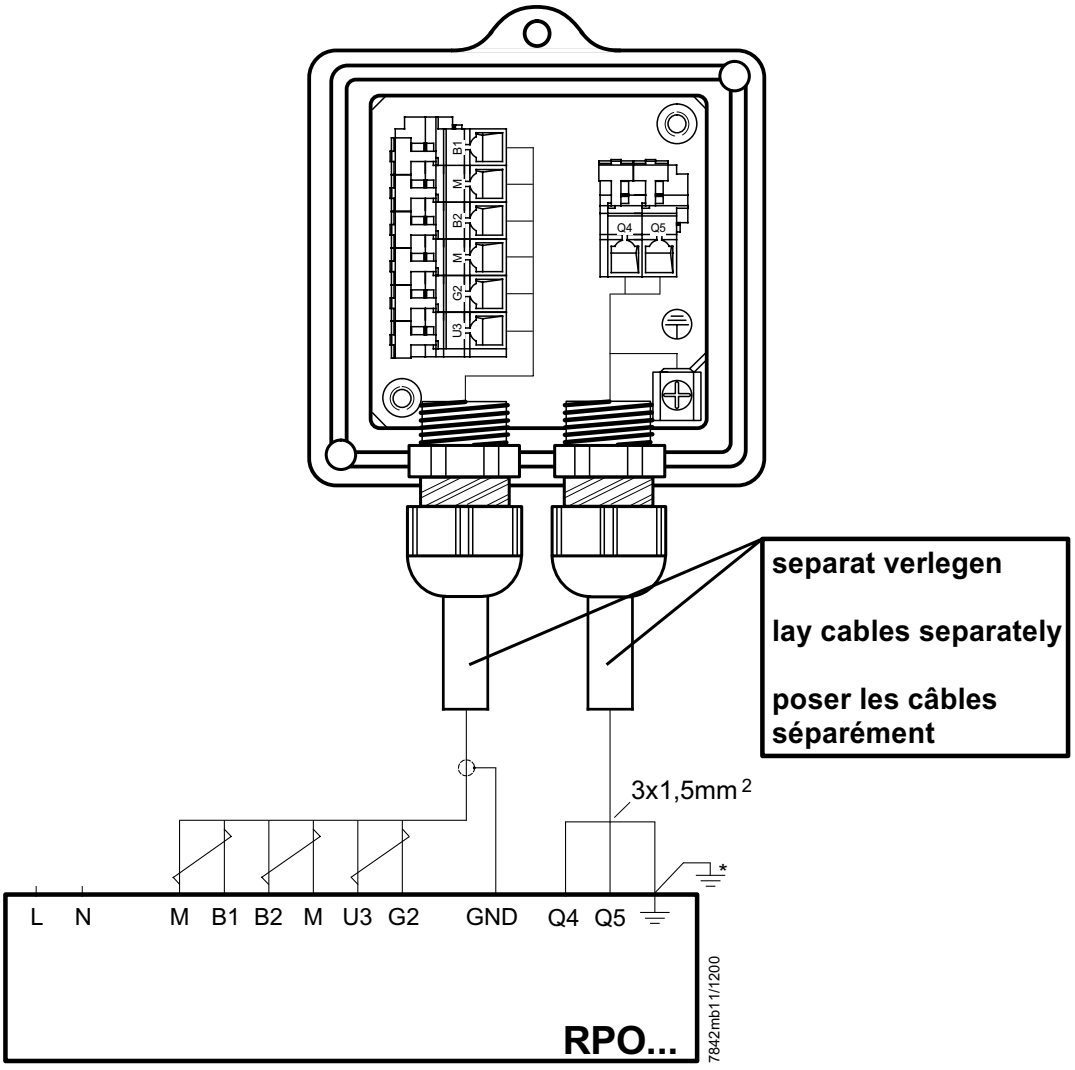
3 x 1,5 mm^2:

Q4	Chauffage de sonde QGO... (AC 230 V)
Q5	Chauffage de sonde QGO... (AC 230 V)

⏚ Terre*

Prière de faire attention lors des raccordements U3 et G2. Une erreur de câblage des fils de raccordement conduit à une destruction de l´élément de compensation.

* Le RPO... ne dispose que d´une seule borne de mise à la terrre. Les deux fils de mise à la terre doivent être connectés sur **la même** borne.



Hinweise für Installation und Inbetriebnahme

- Distanz zwischen Wand des Rauchgaskanals und Rauchgasaustritt (B) des AGO20... min. 10 mm

- Die Kaminisolierung darf nicht über den Anschlussflansch hinausragen und dadurch den Fühlerkopf isolieren (therm. Überlastung).
  Der Fühlerkopf muss frei bleiben!
  Strahlungswärme vermeiden; z.B. durch Wärmeleitbleche

- Bei der ersten Inbetriebnahme ist das Mess-Sytem ca. 2 Stunden vor Gebrauch einzuschalten.
  Bei kurzen Abschaltungen der Anlage (1-2 Wochen) ist es empfehlenswert, das Mess-System (QGO... und RPO) nicht auszuschalten.

- Während des Aufheizvorganges kann der Fühler falsch messen.

- QGO20... nie im kalten Zustand bei laufendem Brenner im Kamin einsetzen.

- Nach Fühlertausch, Ansteuerung der Fühlerheizung überprüfen.

- Spannung an Q4 - Q5 muss im 2 s Takt pulsieren.

- <u>Sofort auschalten</u> falls Spannung nicht pulsiert
➠ RPO austauschen

Commissioning and Installation Guide

- The distance between the wall of the flue gas duct and the flue gas outlet (B) of the AGO20... must be a minimum of 10 mm

- The insulation of the chimney must not project beyond the connecting flange, thus insulating the head of the sensor (thermal overload).
  The head of the sensor must remain uncovered!
  Avoid heat due to radiation, e.g. through thermal conductive plates

- When starting up the plant for the first time, the measuring system should be switched on approx. 2 hours prior to usage.
  If the plant is switched off for short periods of the time (1 to 2 weeks), it is recommended to leave the measuring system (QGO... and RPO) switched on.

- During the heating up phase, the detector could deliver an incorrect signal.

- Never use a cold QGO20... in the flueway while burner is operating.

- After changing the sensor, check the proper functioning of the sensor´s heating element

- Voltage at Q4 - Q5 <u>must</u> pulsate at 2-s intervals

- If voltage does not pulsate, <u>switch equipment off immediately</u>
➠ replace RPO

Instructions de mise en service et installation

- La distance entre la paroi de la conduite de gaz et la sortie des gaz de fumée (B) du AGO20... doit être d´au moins 10 mm.

- L´isolation de la cheminée ne doit pas dépasser la bride de raccordement, c´est-à-dire couvrir la tête de la sonde (surcharge thermique). La tête de la sonde ne doit pas être couverte! Eviter la chaleur de rayonnement, p.ex. par tôles thermoconductrices

- Lors de la première mise en service, le dispositif de mesure doit être raccordé environ 2 heures avant l´utilisation. En case de courtes interruptions de l´installation (1-2 semaines), il est recommandé de ne pas déclencher le dispositif de mesure (QGO... et RPO).

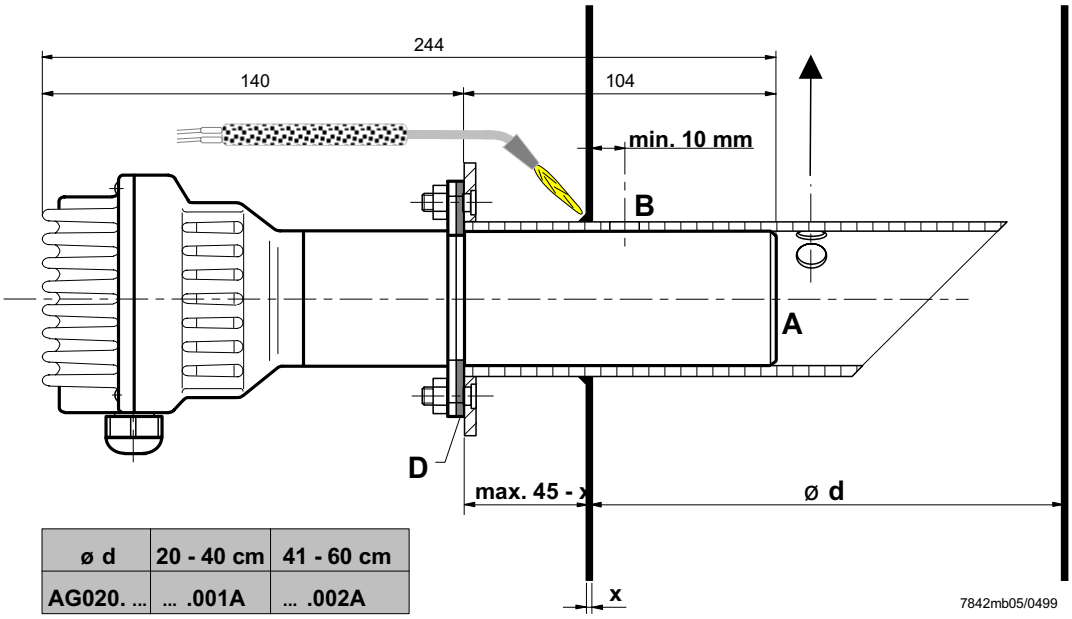
- Pendant l´operation d´échauffement, il est possible que la sonde ne mesure pas correctement.

- Ne jamais introduire le QGO20... à l´état froid ou le laisser introduit dans la cheminée quand le brûleur est en marche.

- Lors d´un changement de sonde, verifier le signal de chauffage de celle-ci.

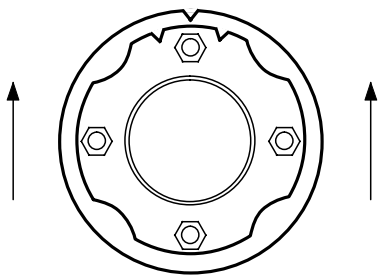
- Les tensions aux bornes Q4 - Q5 <u>doivent</u> commuter toutes les 2 s.

- <u>Déconnecter immédiatement</u> en cas de non-commutation des tensions
➠ Echanger le RPO



ø d	20 - 40 cm	41 - 60 cm
AG020. ...	... .001A	... .002A

Kerben beachten!
Observe notches!
Attention aux entailles!



7842mb06/0499

Legende:

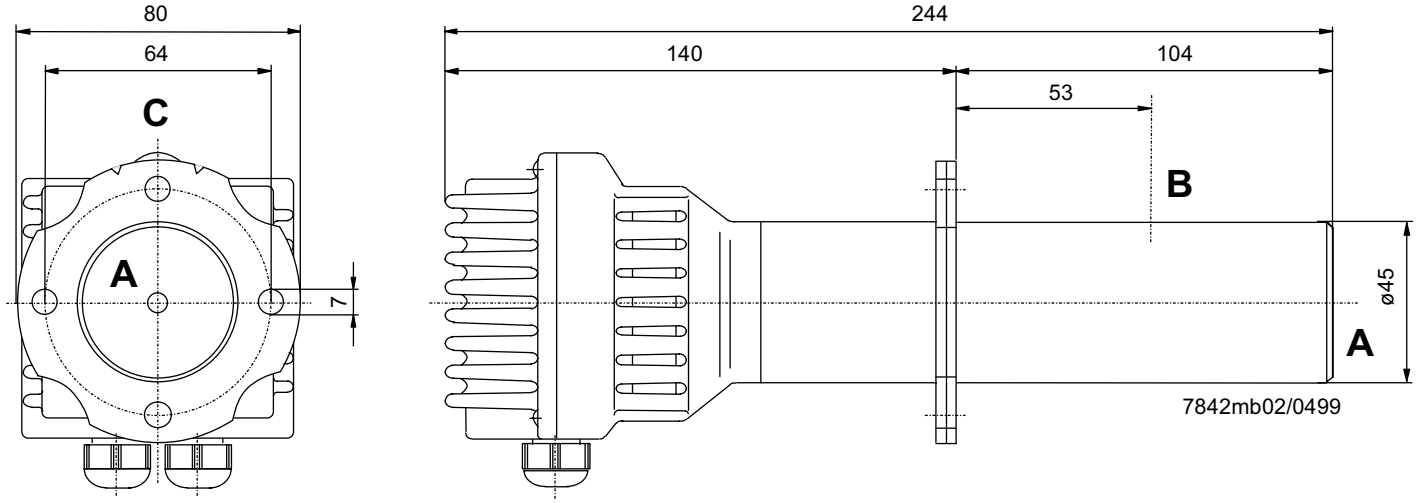
Strömungsrichtung

Direction of flow of flue gases

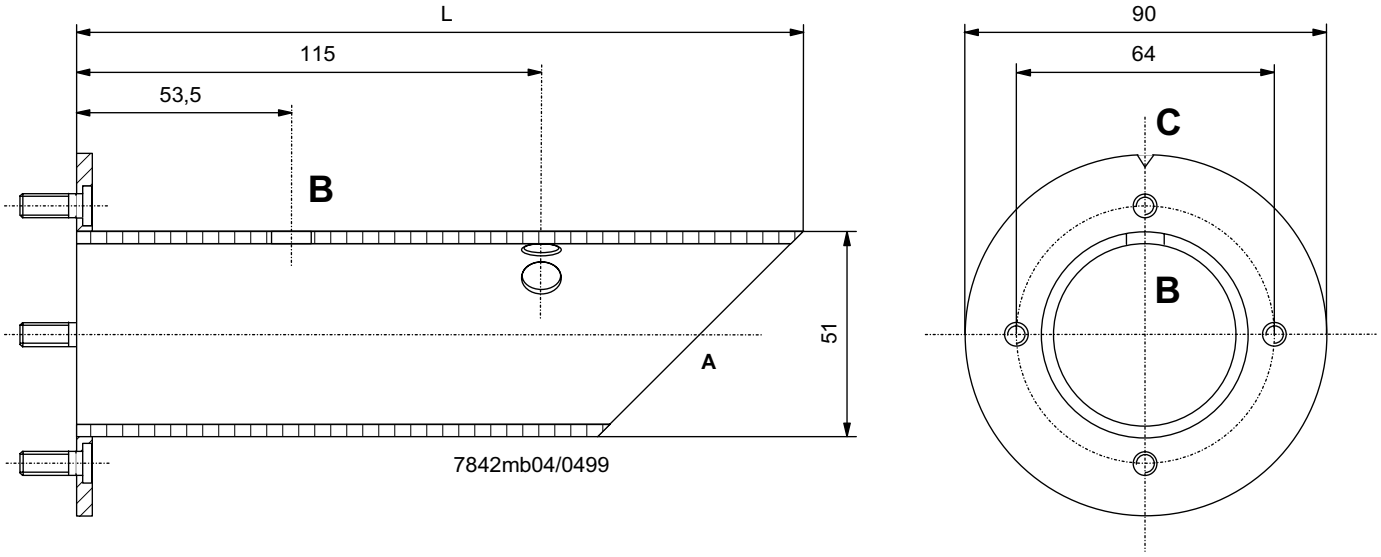
Direction du courant des gaz de fumée

Maßbilder / Dimensions / Encombrements

QGO20...



AGO20...



L = 180 mm für AGO20.001A
L = 260 mm für AGO20.002A

A = Rauchgaseintritt
B = Rauchgasaustritt
C = Kerbe
D = Flachdichtung (beiliegend)

L = 180 mm for AGO20.001A
L = 260 mm for AGO20.002A

A = Flue gas inlet
B = Flue gas outlet
C = Notch
D = Flat seal (enclosed)

L = 180 mm pour AGO20.001A
L = 260 mm pour AGO20.002A

A = Entrée du gaz de fumée
B = Sortie de gaz de fumée
C = Entaille
D = Joint d´étanchéité plat (inclus)

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Technical Data PLL52...

LMV52... basic unit *Refer to chapter Technical Data!*

PLL52...

Mains voltage «X89-01»	AC 120 V –15 % / +10 %	AC 230 V -15 % / +10 %
Safety class	I with parts according to II as per DIN EN 60730-1	
Mains frequency	50 / 60 Hz ±6 %	
Power consumption	Ca. 4 VA	Ca. 4 VA
Degree of protection	IP54, housing closed	

Transformer AGG5.210	
- Primary side	AC 120 V
- Secondary side	AC 12 V (3x)
Transformer AGG5.220	
- Primary side	AC 230 V
- Secondary side	AC 12 V (3x)

Environmental conditions

Storage	DIN EN 60 721-3-1
Climatic conditions	class 1K3
Mechanical conditions	class 1M2
Temperature range	-20...+60 °C
Humidity	< 95 % r.h.
Transport	DIN EN 60 721-3-2
Climatic conditions	class 2K2
Mechanical conditions	class 2M2
Temperature range	-30...+70 °C
Humidity	< 95 % r.h.
Operation	DIN EN 60 721-3-3
Climatic conditions	class 3K5
Mechanical conditions	class 3M2
Temperature range	-20...+60 °C
Humidity	< 95 % r.h.

⚠ **Condensation, formation of ice or ingress of water are not permitted!**

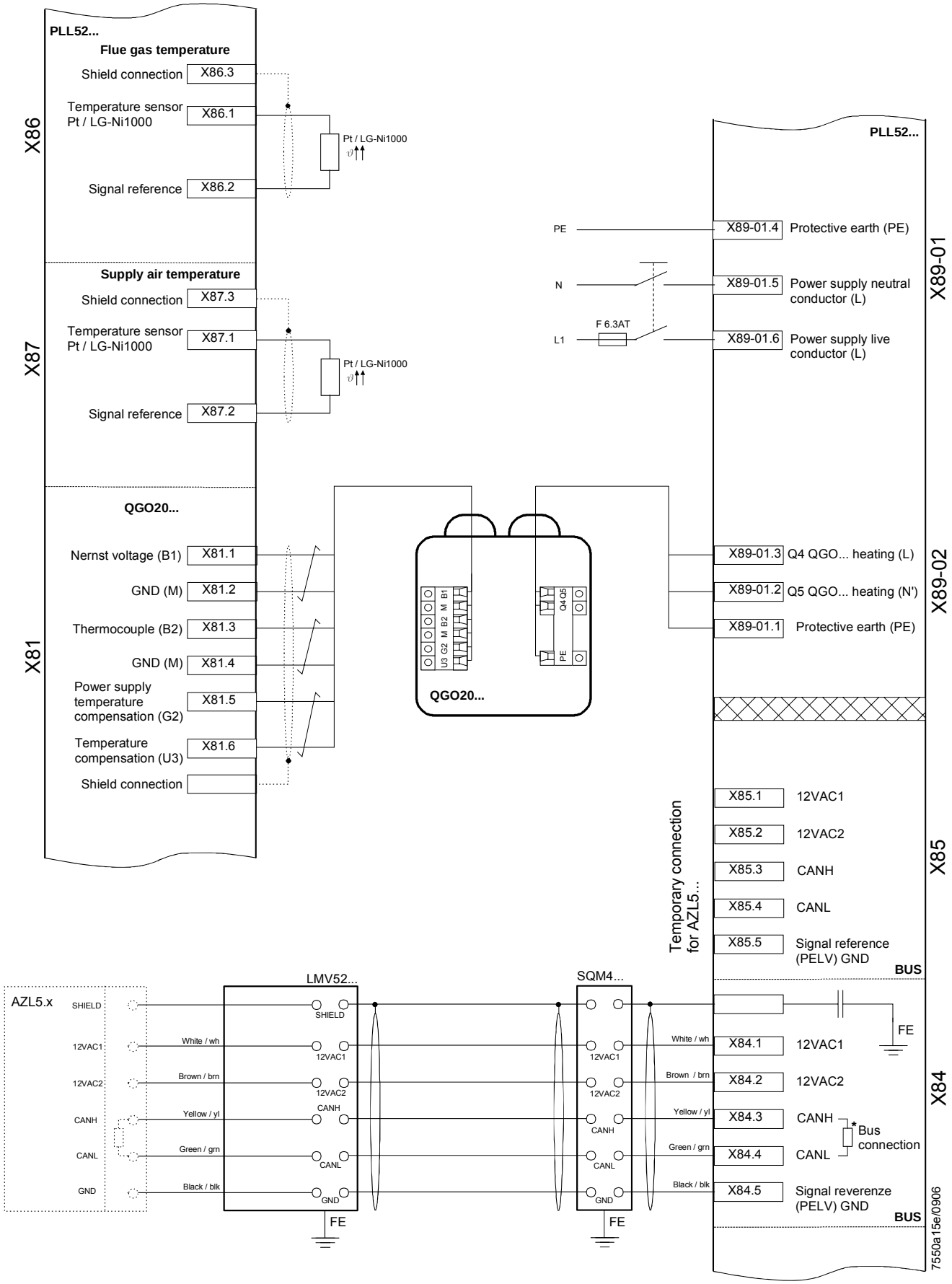
Terminal ratings, cable lengths and cross-sectional areas

LMV52... basic unit Refer to chapter «Technical Data / LMV5... and AZL5...!»

PLL52...

Cable lengths / cross-sectional areas	
Electrical connection «X89»	Screw terminals up to max. 2.5 mm²
Cable lengths	≤10 m to QGO20...
Cross-sectional areas	Refer to description of QGO20... Twisted pairs

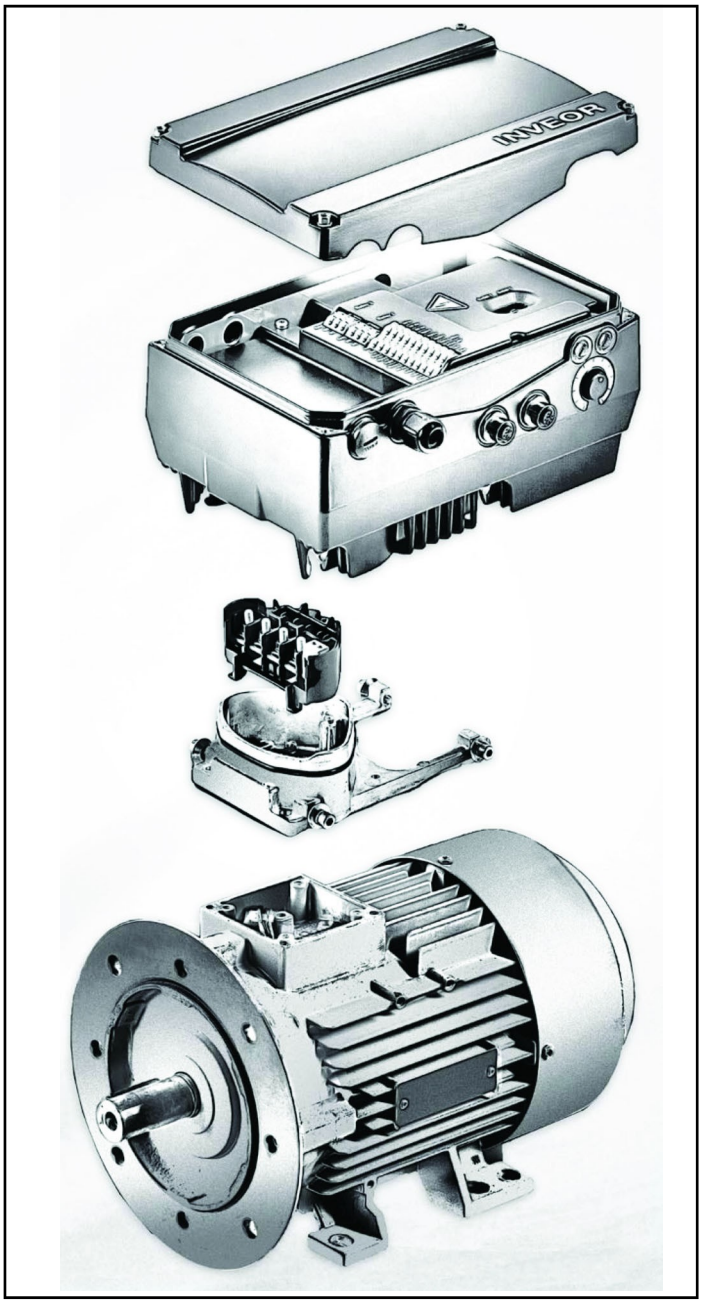
Analog inputs:	
Fresh air temperature detector	Pt1000 / LG-Ni1000
Flue gas temperature detector	Pt1000 / LG-Ni1000
QGO20...	Refer to Data Sheet N7842
Interface	Communication bus for LMV52...


PLL52...
Flue gas temperature
Shield connection
X86.3
Temperature sensor Pt / LG-Ni1000
X86.1
Pt / LG-Ni1000
Signal reference
X86.2
X86
Supply air temperature
Shield connection
X87.3
Temperature sensor Pt / LG-Ni1000
X87.1
Pt / LG-Ni1000
Signal reference
X87.2
X87
QGO20...
Nernst voltage (B1)
X81.1
GND (M)
X81.2
Thermocouple (B2)
X81.3
GND (M)
X81.4
Power supply temperature compensation (G2)
X81.5
Temperature compensation (U3)
X81.6
Shield connection
X81
QGO20...
PLL52...
PE
X89-01.4
Protective earth (PE)
N
X89-01.5
Power supply neutral conductor (L)
F 6.3AT
L1
X89-01.6
Power supply live conductor (L)
X89-01
X89-01.3
Q4 QGO... heating (L)
X89-01.2
Q5 QGO... heating (N')
X89-01.1
Protective earth (PE)
X89-02
X85.1
12VAC1
X85.2
12VAC2
X85.3
CANH
X85.4
CANL
X85.5
Signal reference (PELV) GND
BUS
X85
Temporary connection for AZL5...
AZL5.x
SHIELD
12VAC1
12VAC2
CANH
CANL
GND
White / wh
Brown / brn
Yellow / yl
Green / grn
Black / blk
LMV52...
SQM4...
FE
X84.1
12VAC1
X84.2
12VAC2
X84.3
CANH
X84.4
CANL
X84.5
Signal reverenze (PELV) GND
BUS
Bus connection
X84
7550a15e/0906

KOSTAL INVERTER

Connection and programming
for electronically controlled burners with

LMV2x/3x, LMV5x, ETAMATIC
and INVERTER regulation



Service Manual
TECHNICAL
INSTRUCTIONS

M12938CA - Rel. 0 - 10/2021

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Motor connection variants for INVERTER size D, 6

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Motor data, 11

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Brake chopper connections, 14

Burner terminal with INVERTER interface, 16

IDENTIFICAZIONE INVERTER

INVEOR Mx IVxx PWxx LPxx APxx GHxx DKxx COxx 1

1 2 3 4 5 6 7 8 9 10

	Key		Key
1	Drive controller series: INVEOR	**6**	Application circuit board: AP12 - Standard AP13 - CANopen
2	Installation location/size: motor-integrated - M,size: α, A, B, C, D	**7**	Control: DK01 - Standard (without membrane keypad) DK04 – With membrane keypad
3	Input voltage : IV02 - 230 V	**8**	Housing : GH10 – standard heat sink (black painted)
4	Recommended motor rating : kW: 0.55; 0.75; 1.1; 1.5; 2.2; 3.0; 4.0; 5.5; 7.5; 11.0; 15.0; 18.5; 22.0	**9**	Firmware version : CO00 - Standard CO01 - Specific
5	Printed circuit boards : LP01 / LP03 – Standard (without brake chopper); LP02 / LP04 – Standard (with brake chopper);	**10**	Equipment generation: 1 – current version

The **LMV5x** device controls fan motor rpm via a sensor and commands it via the inverter with a **4÷20mA** signal.
The **LMV3x/LMV2x** device controls fan motor rpm via a sensor and commands it via the inverter with a **0÷10V** signal.
Generally, the inverter curve goes from 50% to 100% of motor rpm. As well as improving burner regulation, this allows for a saving in terms of fan motor consumption.

INVEOR M INVERTER SIZES

TAGLIE
INVERTER INVEOR M...



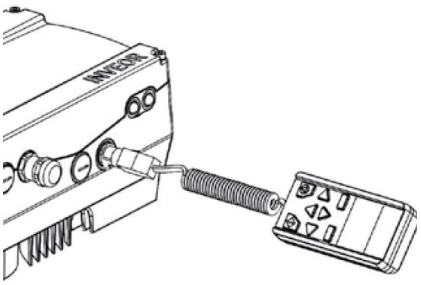
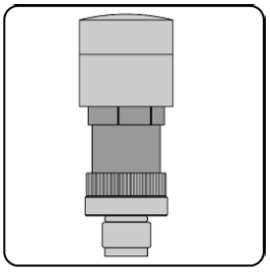
α ***A*** ***B*** ***C*** ***D***

User interface

COMMUNICATION (on request)

The drive controller can be put in operation in the following ways:

Attention: Contact the manufacturer to order the most suitable device.

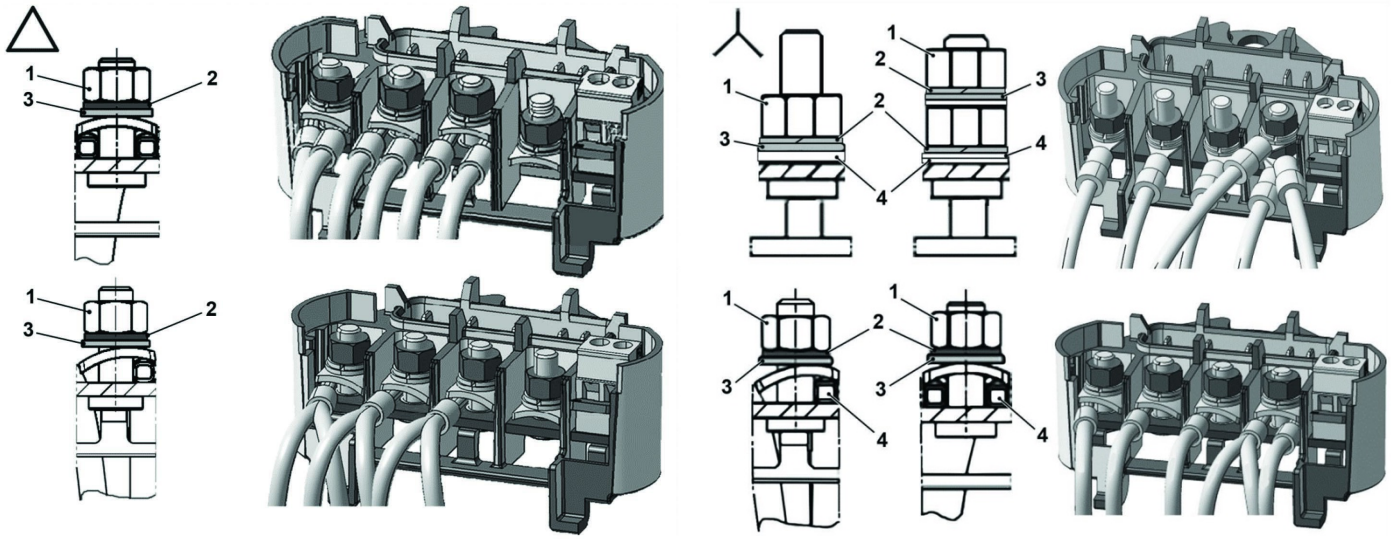
USB adaptor for PC	
Via the INVERTER PC software	
	
INVEOR MMI remote display:	
INVEOR MMI is a portable display on which all inverter parameters can be viewed and changed. Manual available on the KOSTAL website.	
Bluetooth connection:	
Using the Bluetooth adaptor you can connect via app from any device. Download the app for Android / iOS from the Google Play Store / App Store.	
The Bluetooth adaptor is required to create a Bluetooth connection with the inverter. To view and change the inverter parameters, use an external interface device – tablet or mobile phone. Download the app for Android / iOS from the Google Play Store / App Store.	

ELECTRICAL CONNECTIONS

Motor connection variants for INVERTERS sizes A, B and C

Star or delta connection for speed controller integrated on the motor

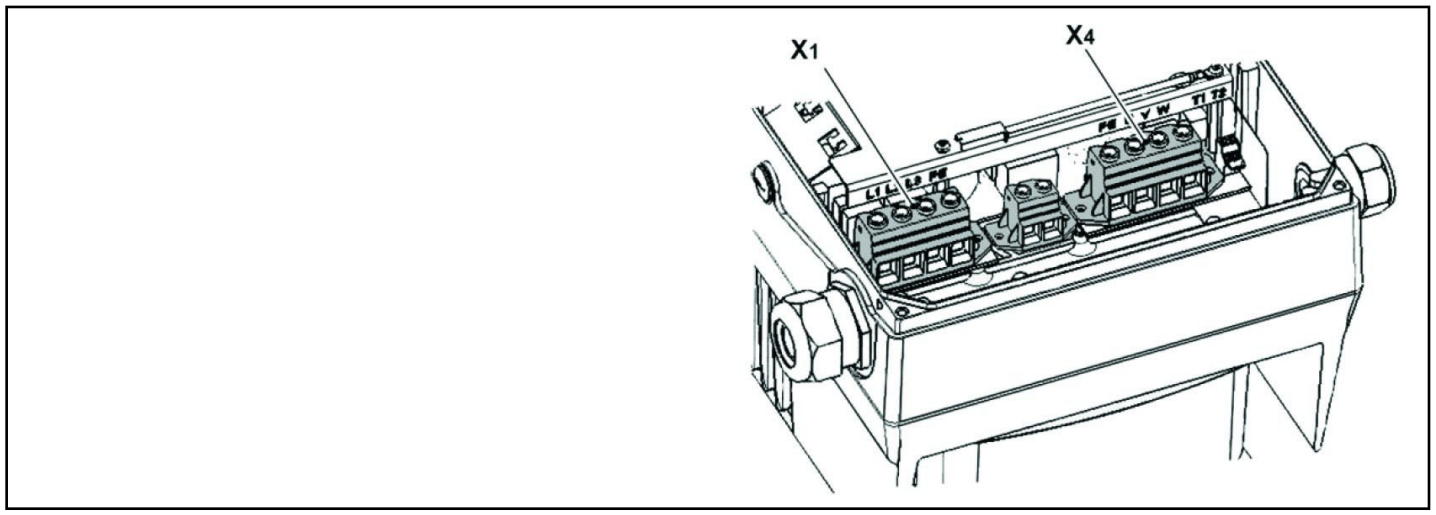
Delta connection variant ***Star connection variant***



1 Nut MA = 5 Nm
2 Circlip
3 Plain washer
4 Cable shoe

Fig. 1

Motor connection variants for INVERTER size D



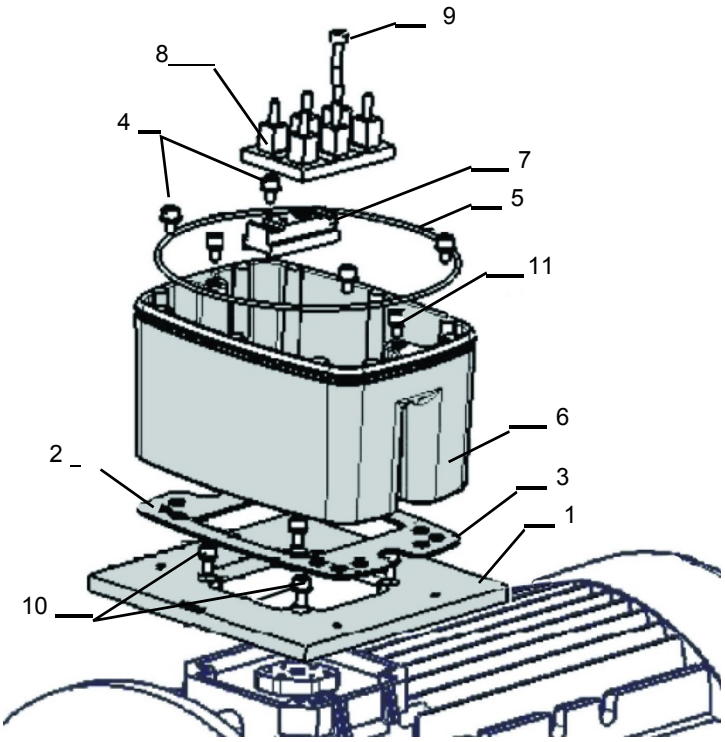
X1 terminal no.	Designation	Assignment
1	L1	Mains phase 1
2	L2	Mains phase 2
3	L3	Mains phase 3
4	PE	Protective conductor

Tab. 1 - X1 terminal assignment - 3 x 400 VAC

X4 terminal no.	Designation	Assignment
1	PE	Protective conductor
2	U	Mains phase 1
3	V	Mains phase 2
4	W	Mains phase 3

Tab. 2 - X1 terminal assignment - 3 x 400 VAC

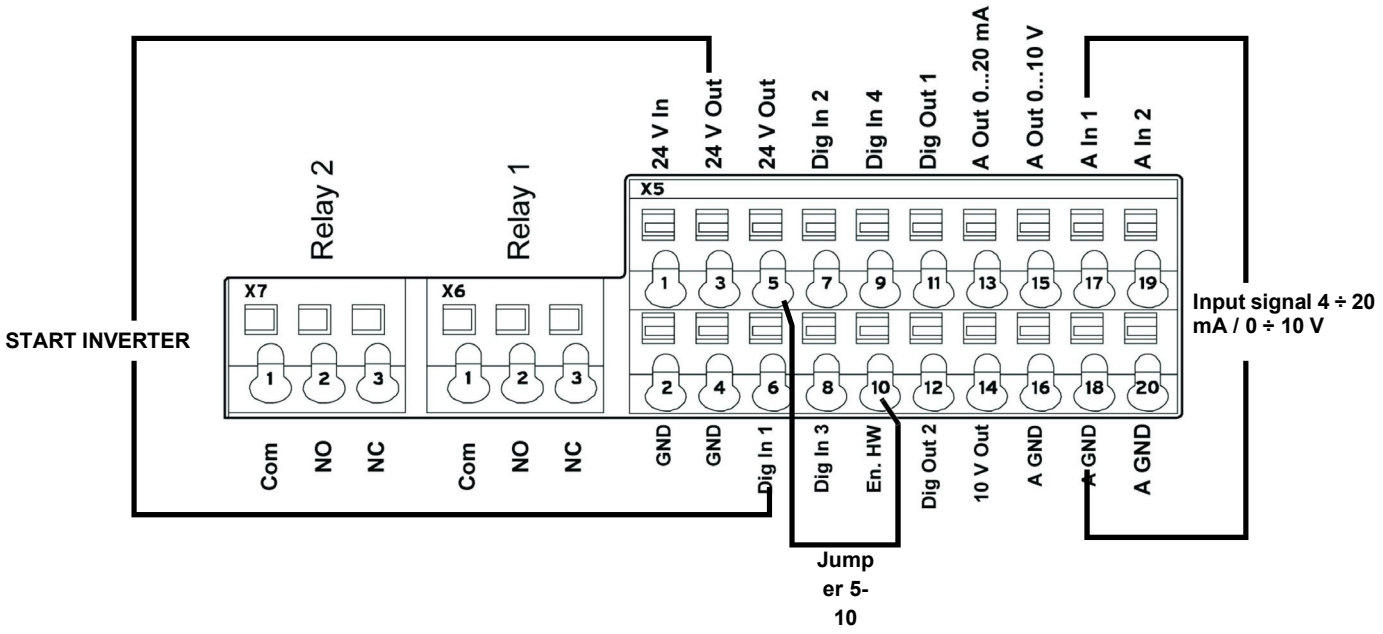
Fig. 2 – Assembly sequence: Connection box – adapter plate size D



Key:

1 Adapter plate option (variant)
2 Holes depending on motor
3 Seal
4 Retaining bolts with spring elements
5 O-ring seal
6 INVEOR / adapter plate support
7 Terminal heightening option
8 Original terminal (not included)
9 Extended screw option (for pos.7)
10 Retaining bolts with spring elements option
11 INVEOR/support retaining bolts

Connection of INVERTER signals and commands

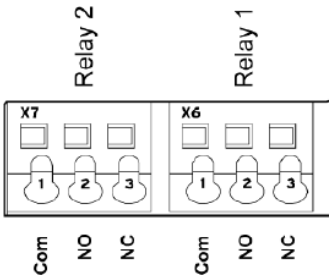


Electrical connections and parameter configuration

There are 2 relays on the INVERTER. Connecting terminals X7-1-2-3 and X6-1-2-3 are used for:

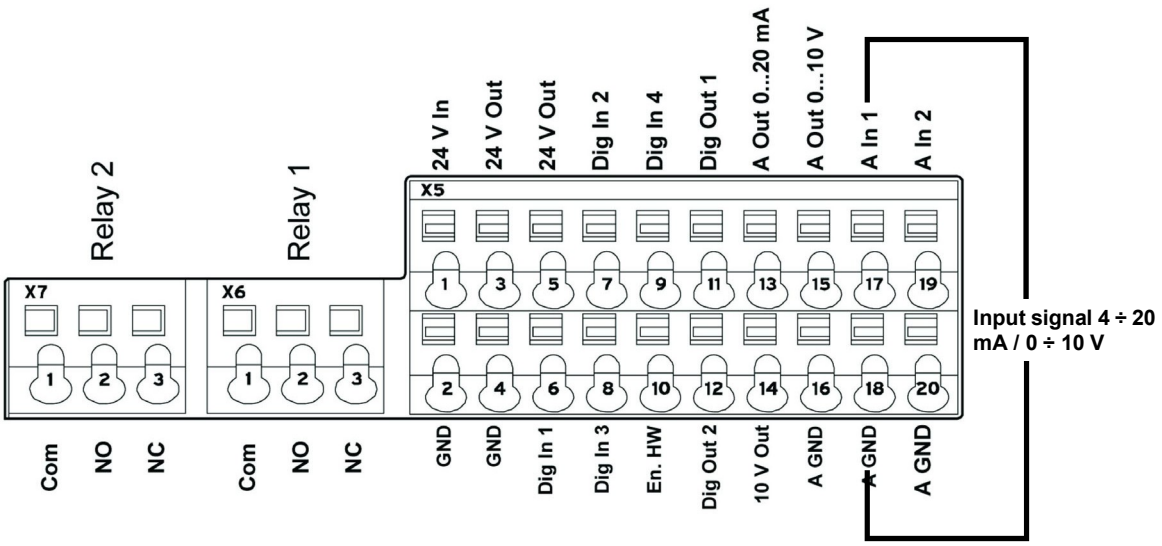
LMV2/3x: Relay 1 is used as a safety contact on the safety loop series of the equipment. Relay 2 is used as a fault indicator on the burner panel front.

LMV5x / ETAMATIC: Relay 1 is used as a contact for control of fan motor start. Relay 2 is used as a fault indicator of the INVERTER to the LMV5x / ETAMATIC equipment.



Parameter		
1.181	Automatic reset function	Automatic reset of faults. The INVERTER resets the fault after the set time. **Set value = 30 seconds**
1.182	Automatic reset numbers	With the reset function the maximum number of automatic resets can be limited. **Set value = 0 (maximum number of automatic resets)**
4.190	Relay 1 functions	Select the operating mode of relay 1. **Set value = LMV2x/3x..= 11 (NC inverted error)** **Set value = LMV5x / ETAMATIC = 19 (motor is in NO function)**
4.210	Relay 2 functions	Select the operating mode of relay 2. **Set value = LMV2x/3x..= 11 (NC inverted error)** **Set value = LMV5x / ETAMATIC = 11 (NC inverted error)**
4.210	V O operation	**Set value = 10 (NO error)**

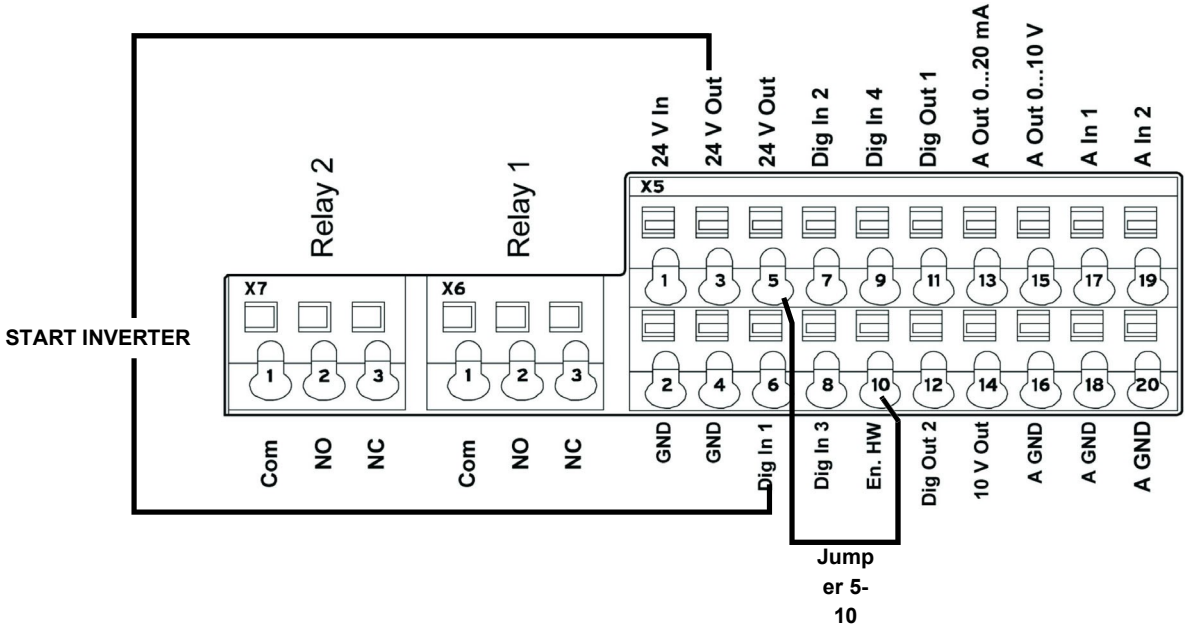
0-10V / 4-20mA analogue input configuration



Input AIn1 can be configured as voltage or current input. It is configured as 4-20mA input current for LMV5-Etamatic, and 0-10V input voltage for LMV2x/3x.

4.020	Input type AI1	Specifies the input type, whether voltage or current. **1**= Voltage input 0-10V (LMV2x/3x) **2**= Current input 0/4-20mA (LMV5 ETAMATIC)
4.021	AI1 Standard low	Specifies the minimum value of the analogue input as a percentage of the range. E.g.: 0…10 V or 0…20 mA = 0 %...100 % 2…10 V or 4…20 mA = 20 %...100 % **Set value = 20% for LMV2x/3x, LMV5x, ETAMATIC**
4.022	AI1 Standard high	Specifies the maximum value of the analogue input as a percentage of the range at 10V or 20mA. **Set value = 100%**
4.023	AI1 Response time	Specifies the deadband on the input signal. **Set value = 1%**
4.024	AI1 Filter time	An input change is taken into consideration after this time. If it is too short, a wire break error may appear if the 4-20 mA signal goes to 0 for a short time. **Set value = 4 seconds**
4.030	AI1 Input function	Specifies whether the input is 0 = analogue / 1 = digital input. **Set value = 0 analogue**
4.033	AI1 Measure unit, input 1	Specifies the unit of measurement of input 1. **Set value = 0 (%)**
4.034	AI1 Lower limit	Specifies the lower limit of input 1. **Set value = 0 (%)**
4.035	AI1 Upper limit	Specifies the upper limit of input 1. **Set value = 100 (%)**
4.036	AI1 Wire break time, 5s	Specifies the time after which the fault appears if input AI1 is interrupted (wire break). **Set value = 5 seconds**
4.037	AI1 Inversion	Inverts the signal of input 1. **Set value = 0 (disabled)**

Configuration of control contact / INVERTER starting and stopping



Terminal	
X5-3 (24V Out)… X5-6 (Digit In1)..	Bringing 24V to terminal **X5-6** enables INVERTER operation and the contact that switches it on/off. On LMV2/3x **X5-3** (24V Out) also powers the motor speed encoder.
X5-5 (24V Out) connected with X5-10 (En.HW)…	Required to enable braking ramp xxxx

Configuration of INVERTER start / stop parameters and operating mode

Parameter		
1.020	Min. frequency (Hz)	Minimum input frequency in Hz. **Set value = 0 Hz (LMV2x-3x / LMV5x)** **Set value = > 35 Hz (ETAMATIC)**
1.021	Max. frequency (Hz)	Maximum input frequency in Hz. **Set value = 51,5 Hz (LMV2x-3x / LMV5x)** **Set value = 50 Hz (ETAMATIC)**
1.050	Ramp 1 Braking time 1	Braking time at switch-off to reach the speed of 0 Hz after the start/stop contact has opened (not used). **Set value = 10 seconds**
1.051	Ramp 1 Acceleration time 1	Acceleration time 1 is the time necessary for the drive controller to accelerate from 0 Hz to maximum frequency (not used). **Set value = 10 seconds**
1.052	Ramp 2 Braking time 2	Braking time at switch-off to reach the speed of 0 Hz after the start/stop contact has opened. **Set value = 10 seconds**
1.053	Ramp 2 Acceleration time 2	Acceleration time 2 is the time necessary for the drive controller to accelerate from 0 Hz to maximum frequency. **Set value = 10 seconds**
1.054	Selects ramp used	Digital input 1 (**dig In1 / X5-6**) selects the ramp used. **Set value = 1 (parameters 1.052 and 1.053)**
1.088	Quick stop	Not used but set. **Set value = 10 seconds**
1.100	Operating mode	Frequency control mode: specifies the operating mode of the INVERTER. In our case it is always frequency control (0). **Set value = 0**
1.130	Reference set point	Determines the source from which the reference value is read. In our case it is always analogue input AI1. **Set value = 1 (analogue input 1)**
1.131	Enabling software	Depending on the change made, the motor may start immediately. Selection of the source for enabling control. **Set value = 0**
1.132	Start-up protection	Selection of behaviour in response to enabling software. **Set value = 1** **(Start only with rising edge at input of control enable)**
1.150	Motor rotation direction	Do not change this parameter. To invert the direction of rotation, invert 2 of the 3 INVERTER / MOTOR cabling wires, so that the INVERTERS always have the same setting. **Set value = 1 forwards only / clockwise rotation** **(no changes to direction of rotation are possible)**

Motor data

The motor data depend on the type of motor used. Refer to the data shown on the motor nameplate. Follow the steps below:

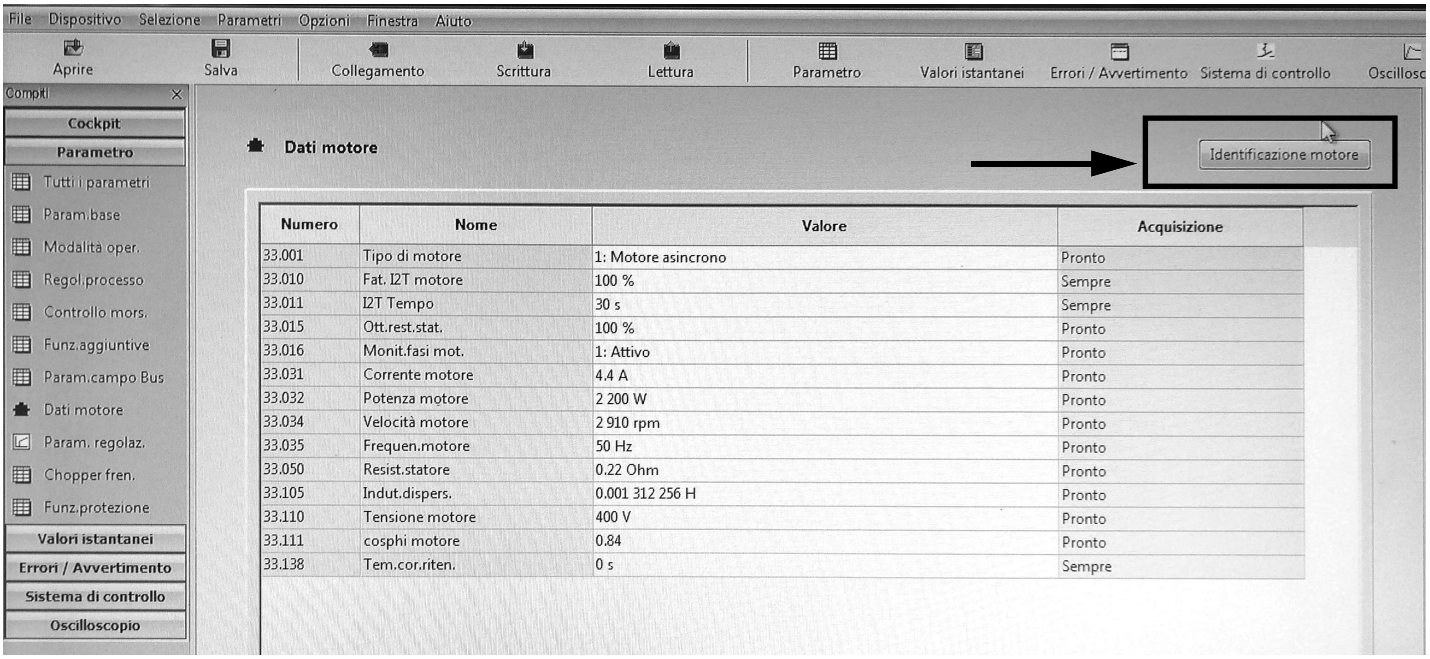
- Enter the motor data;
- Activate the motor recognition function;
- If the operation ends successfully, enter the remaining parameters.

During the recognition phase, the INVERTER measures some parameters and changes some settings.

N.B.: At each start-up of the recognition programme, recheck all the parameters in this manual.

Parameter		
33.001	Motor type	Selection of motor type. **Set value = 1 (asynchronous motor)**
33.010	Motor I^2t factor	Not used. Only for encoders. **Set value = 100%**
33.011	I^2t time	Not used. Only for encoders **Set value = 30 seconds**
33.015	R optimisation	If necessary, this parameter can be used to optimise the start-up behaviour. Not used **Set value = 100%**
33.016	Motor phase control	The "Motor connection interrupted" error monitoring (error 45) can be enabled/disabled with this parameter. **Set value = 1 (enabled control)**
33.031	Motor current	Maximum motor current. **Set value = motor nameplate current value in amps**
33.032	Motor rating	Motor shaft rating. **Set value = motor nameplate rating value in watts**
33.034	Motor rpm	Motor rpm. **Set value = motor nameplate speed in rpm**
33.035	Motor frequency	Nominal motor frequency. **Set value = motor nameplate frequency in Hz**
33.050	Stator resistance	Recognised by INVERTER. **Set value = automatically detected, value in Ohm**
33.105	Leakage inductance	Recognised by INVERTER. **Set value = automatically detected, value in henry**
33.110	Motor voltage	Nominal motor voltage. **Set value = 400V**
33.111	Motor cos phi	Data on motor nameplate. **Set value = 0,xx**
33.138	Holding current time	Needed to stop the motor!! After braking it is held at continuous current for a specified time interval. Ensure that there is no overheating in this phase. Recommended time: max 5 s. **Set value = 0 seconds**

Activate the “Motor identification” function and follow the instructions proposed by the INVERTER, then change the parameters described below. The image shows the software screen on the PC.



Parameter		
34.010	**Control type**	Open-loop asynchronous motor. **Set value = 100 (open-loop asynchronous motor)**
34.020	**Flying restart**	**Set value = 1 (enabled)**
34.021	**Flying restart time**	Calculated by Inverter. **Set value = value calculated by INVERTER in ms**
34.090	**Speed controller KP**	Calculated by the inverter during the motor recognition phase. Reset it to 2000 after motor recognition. **Set value = 2000 mA/rad/sec**
34.091	**Speed controller TN**	Calculated by the inverter during the motor recognition phase. Reset it to 7.5 seconds after motor recognition. **Set value = 7.5 seconds**
34.110	**Slip trimmer**	If set to **1** the function is enabled. If set to **0** the motor performs as if connected to the mains. If compensation is enabled, the system aligns the stator frequency with the rotor. As a result, the actual motor rpm increase and are brought in line with the theoretical motor nameplate rpm. The motor is supplied with the same voltage and frequency, but the current increases and the rpm are brought to the nameplate data. **Set value = 1 (compensation for slippage)**

Output signal variant for reading motor rpm (optional)

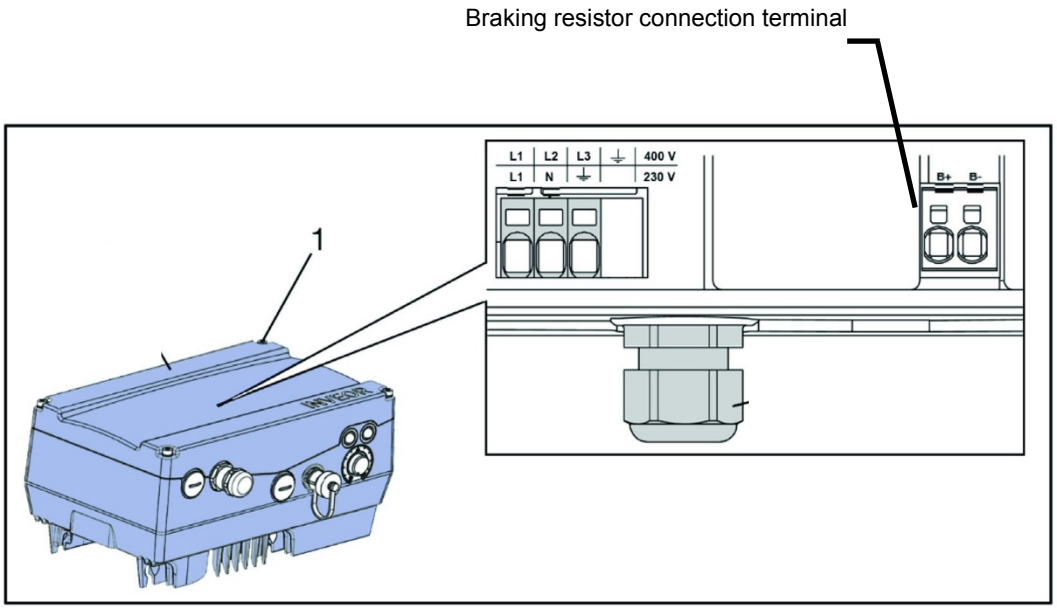
To have a 4-20 mA analogue output that indicates the motor rpm to the terminals X5-13 (Aout 0-20 mA) and X5-16 (A GND), set the parameters below:

Parameter		
4.100	Analogue output AO1	Selection of analogue output options. In our case, to have an output proportional to the rpm, set 19. **Set value = 19 (actual rpm)**
4.101	Minimum value of analogue output AO1	Output signal at 0-20 mA. To obtain a 4-20 mA signal with (4 mA = 0 motor rpm), follow the example: if motor rpm are a maximum 2900, calculate: 2900 / 20 x 4 = **580**, which is the negative value corresponding to 0 mA from which to start. Therefore: 0 mA = - 580, 20 mA = 2900 **Set value = - xxx (-580 in the example)**
4.102	Maximum value of analogue output AO1	Maximum rpm value for 20 mA. **Set value = xxxx (2900 in the above example)**

NOTE 1	If the system enters pendulum mode with LMV.. / ETAMATIC, adjust parameters **34.090** and **34.091** by increasing them, in particular parameter **34.090**, in steps of 100mA/rad/sec.
NOTE 2	With LMV 2x/3x with INVERTER control, the device controls the standby rpm with **param. 653**. If, after the fan is switched off, the device LMV 2x/3x sees that the motor continues to run, error **83** diagnostic **32** appears. This occurs if there is significant fan inertia (e.g. on burners with very heavy forward curved blades), then always disable parameter 653, setting it to **0**.
NOTE 3	With LMV 2x/3x the signal 0-10V for motor rpm control during standardisation is brought to approximately 9.7 V and the fan motor rpm is saved. According to the LMV manual, the INVERTER should be set to max 52.5 Hz During standardisation, the INVERTER is driven at approximately 51 ÷ 51.5 Hz and may go out of absorption range with the motor. For this reason, set the INVERTER to max 51.5 Hz. During standardisation, the INVERTER will reach 50Hz and the over-absorption problem will be reduced.
NOTE 4	**If the <u>analogue wire break fault</u> is displayed on the INVERTER and the 4-20 mA inverter signal continues to oscillate between 1 ÷ 6 mA, it does not always mean that the LMV 2x/3x or ETAMATIC equipment is faulty. It could be due to the old firmware of the INVERTER and should therefore be updated. If this is the case, contact the Service Centre.**

FAULTS / PROBLEMS.. SOLUTIONS		
Parameter 36.020	If error 36 appears	Problems detected in the mains supply. By setting this parameter to 0, the INVERTER no longer checks the mains and the error message disappears. It is recommended to leave the parameter set to 1.
Parameter 33.105	If mains voltage drops during operation	When the mains voltage drops, the INVERTER decreases the motor rpm. To reduce this change, set the parameter to 0, which should solve the problem.

Brake chopper connections



Brake chopper connections

Terminal no.	Designation	Assignment
1	B+	Braking resistor connection (+)
2	B-	Braking resistor connection (-)

Optional assignment of brake chopper

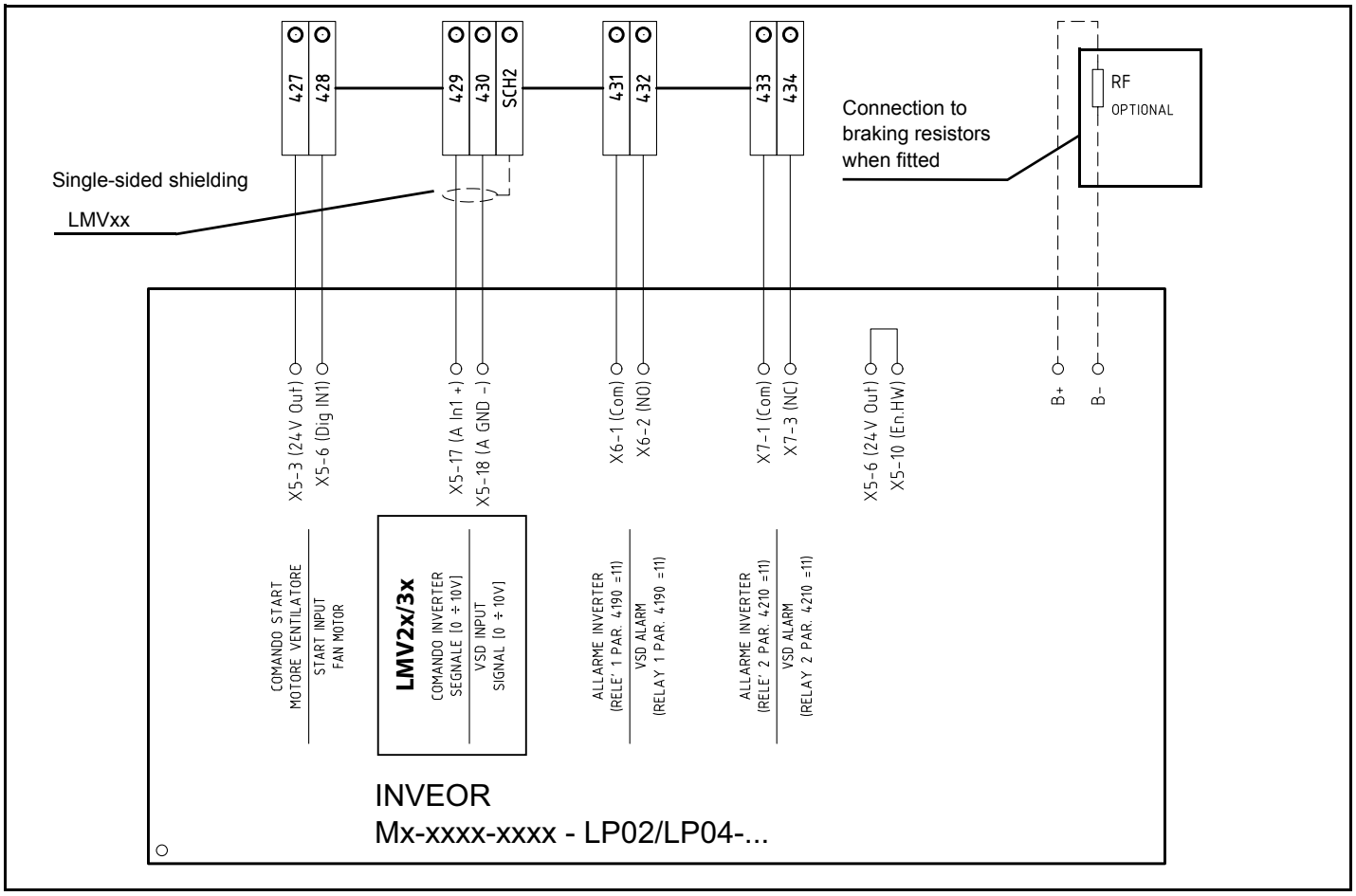
Parameter	
Braking resistor	Enabled or disabled

Braking resistors

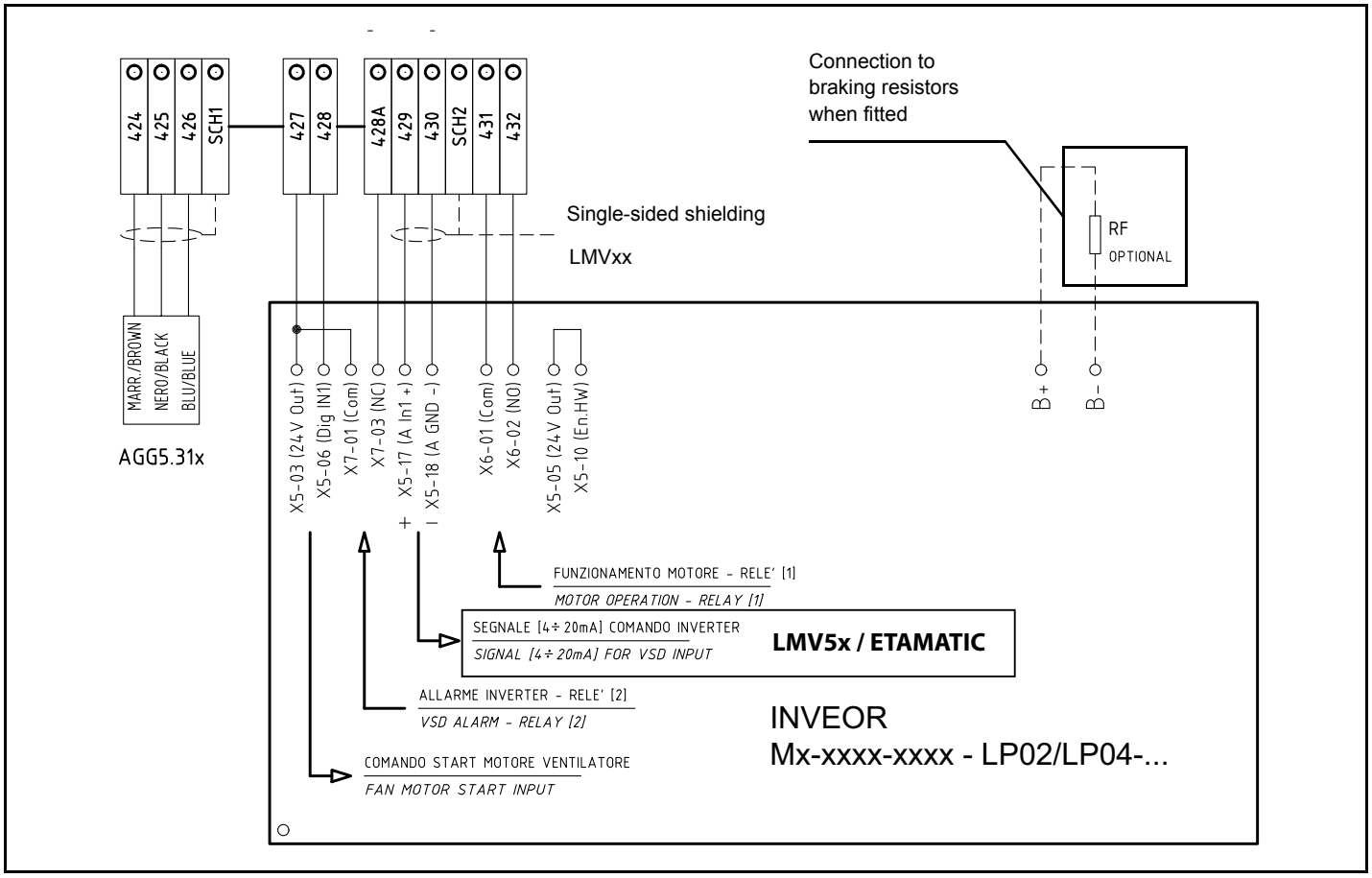


Burner terminal block with interface INVERTER

Versioni bruciatore con LMV2x/3x



Versioni bruciatore con LMV5x o ETAMATIC



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Note: specifications and data subject to change. Errors and omissions excepted.