

R91..VS R92..VS R93..VS R515..VS R520..VS R525..VS

Gas - light oil burners

LMV5x Microprocessor-controlled

**MANUAL OF INSTALLATION - USE - MAINTENANCE** 

# **CIB** UNIGAS

BURNERS - BRUCIATORI - BRULERS - BRENNER - QUEMADORES - ГОРЕЛКИ

M039228CB Rel 1.2 04/2011

### 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

- 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 noncompliance 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 harm-less.

- 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:

- 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

i ype	
Model	
Year	
S.Number	
Output	
Oil Flow	
Fuel	
Category	
Gas Pressure	
Viscosity	
EI.Supply	
El.Consump.	
Fan Motor	
Protection	
Drwaing n°	
PIN	

Consump

#### Precautions if you can smell gas

- do not operate electric switches, the telephone, or any other item а likely to generate sparks;
- b immediately open doors and windows to create an air flow to purge the room;
- close the gas valves; С
- contact qualified personnel. d
- 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



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.



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 PPF

#### 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 - Light oil 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)

UNI EN 267-2011 (Automatic forced draught burners for liquid 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**

These burners are designed to be installed into boilers provided with very big combustion chamber but the tube nest very close to the burner stokhole. The flame produced by this burner series is very short, but has the energy necessary to take up all the combustion chamber and then exchange this energy to the water, as to get very high efficiency. The construction and test of these burners are performed both in laboratories and directly on site, observing the peculiarities of these boilers: the need to operate in slight depression and to heat the boiler in low flame for a long time before exploiting the highest performance. The flame is divided into smaller flames performing the same output but distributing the energy uniformly without stressing the boiler structure. To complete this product range, the flame modulation is performed by a modulator with pressure probe connected to. These burners can be provided for all kinds of fuels and can be designed according to the customer requests. They are provided with all the safety requirements according to the Standards in force These burners can be installed in the newest microprocessor-controlled systems.



# Burner model identification

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

Type <b>R91</b>	Model	MG.	PR.	S.	*.	VS.	8.	50.	ES	
(1)		(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	
(1)BURNER	TYPE			R91	- R92	- R93	- R515	- R520	- R525	
(2)FUEL				MG	- Natu	iral gas	s-Light o	oil		
(3)OPERAT	ON			PR -	Progr	ressive	Μ	ID - Full	y modulating	
(4)BLAST T	JBE			S - s	tanda	rd	L	- Exten	ded	
(5)DESTINA	TION COUNT	RY		* - S6	ee dat	a plate				
(6)BURNER	VERSION			VS -	Short	flame				
(7)EQUIPME	ENT			0 = 2 1 = 8 = 2	2 Gas 2 Gas 2 Gas	valves valves valves	s + gas + gas p	proving proving	system 7 = 2 system+high g	Gas valves+high gas pressure switch gas pressure switchl
(8)GAS CON	INECTION			50 =	Rp2	65	5 = DN6	5 8	30 = DN80	100 = DN100
(9) GAS CO	NECTION			ES = EO = EI = \ EK =	with n with C with no with C	$O_2$ trim $O_2$ trim $O_2$ tri $O_2$ trim $O_2$ trim	im cont control m contr control	trol, with , with ne ol, with , with V	n no VSD cont o VSD control VSD control SD control	rol

# Specifications

BURNER TYPE		R91VS	R92VS	R93VS							
Output	min max. kW	480 - 2670	480 - 3050	550 - 4100							
Fuel		MG	MG - Natural gas-Light oil								
Category		see ne	ext paragraph "Gas cat	egory"							
Gas rate	min - max (Stm <sup>3</sup> /h)	51 - 283	51 - 323	58 - 434							
Gas pressure	min max. mbar		(see Note 2)								
Power supply			400V 3N ~ 50Hz								
Total power consumption	kW	4.5	6	8							
Electric motor	kW	4	5.5	7.5							
Protection			IP40								
Approx. weight	kg	320	370	420							
Operation		Pro	gressive Fully modulat	ling							
Gas Train50	Gas connection	2" / Rp2	2" / Rp2	-							
Gas Train65	Gas connection	2"1/2 / DN65	2"1/2 / DN65	2"1/2 / DN65							
Gas Train	Gas connection	3" / DN80	3" / DN80	3" / DNN80							
Gas Train	Gas connection	4" / DN100	4" / DN100	4" / DN100							
Operating temperature	°C	-10 / +50									
Storage Temperature	°C		-20 / +60								
Working service *			Intermittent								

Note1:	All gas flow rates are referred to Stm <sup>3</sup> /h (1013 mbar pressure, 15 °C temperature) and are valid for G20 Natural gas (nett calorific value: 34.02 MJ/Stm <sup>3</sup> ).
Note2:	Maximum gas pressure = 500mbar (with Siemens VGD gas valves).
	Minimum gas pressure = see gas curves.

BURNER TYPE		R515VS	R520VS	R525VS
Output	min max. kW	770 - 5200	1000 - 6400	2000 - 8000
Fuel		М	G - Natural gas-Ligh	it oil
Category		see nex	t paragraph "Gas cate	gory"
Gas rate	min - max (Stm <sup>3</sup> /h)	81.5 - 550	106 - 677	212 - 847
Gas pressure	min max. mbar		(see Note 2)	- -
Power supply			400V 3N ~ 50Hz	
Total power consumption	kW	11.5	15.5	19
Electric motor	kW	11	15	18.5
Protection			IP40	- -
Approx. weight	kg	550	560	570
Operation		Pro	ogressive Fully modula	ting
Gas Train50	/Gas connection	2" / Rp2	2" / Rp2	-
Gas Train65	/Gas connection	2"1/2 / DN65	2"1/2 / DN65	2"1/2 / DN65
Gas Train	/Gas connection	3" / DN80	3" / DN80	3" / DNN80
Gas Train	/Gas connection	4" / DN100	4" / DN100	4" / DN100
Operating temperature	°C		-10 / +50	
Storage Temperature	°C		-20 / +60	
Working service			Intermittent	

Note1:	All gas flow rates are referred to Stm <sup>3</sup> /h (1013 mbar pressure, 15 °C temperature) and are valid for G20 Natural gas (nett calorific value: 34.02 MJ/Stm <sup>3</sup> ).
Note2:	Maximum gas pressure = 500mbar (with Siemens VGD gas valves).
	Minimum gas pressure = see gas curves.

# Country and usefulness gas categories

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

# Matching the burner to the boiler

To correctly match the burner to the boiler verify the necessary input and the pressure in combustion chamber are included in the burner performance curve; otherwise the choice of the burner must be revised consulting the burner manufacturer.





Recommended	boiler	drilling
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	DN*	Α	AA	AD	AN	AP	В	BB	С	CC	D	Е	F	FF	G	GG	Н	ΗН	J	κ	L	Μ	0	Ρ	Q	R	S	U	V	W	Ζ
R91 VS - 1.50	50	1464	411	20	549	100	326	419	1138	532	1173	737	436	255	386	255	442	221	449	550	464	M12	510	510	778	404	374	624	216	739	185
R91 VS - 1.65	65	1464	411	20	565	118	326	419	1138	532	1370	934	436	255	386	255	442	221	447	550	464	M12	510	510	887	404	483	843	290	739	185
R91 VS - 1.80	80	1464	411	20	579	132	326	419	1138	532	1405	969	436	255	386	255	442	221	447	550	464	M12	510	510	939	404	535	875	319	739	185
R91 VS - 1.100	100	1464	411	20	592	145	326	419	1138	532	1488	1052	436	255	386	255	442	221	447	550	464	M12	510	510	1046	404	642	942	379	739	185
R92 VS - 1.50	50	1464	411	20	549	100	326	419	1138	532	1173	737	436	255	386	255	442	221	449	550	464	M12	510	510	778	404	374	624	216	739	185
R92 VS - 1.65	65	1464	411	20	565	118	326	419	1138	532	1370	934	436	255	386	255	442	221	447	550	464	M12	510	510	887	404	483	843	290	739	185
R92 VS - 1.80	80	1464	411	20	579	132	326	419	1138	532	1405	969	436	255	386	255	442	221	447	550	464	M12	510	510	939	404	535	875	319	739	185
R92 VS - 1.100	100	1464	411	20	592	145	326	419	1138	532	1488	1052	436	255	386	255	442	221	447	550	464	M12	510	510	1046	404	642	942	379	739	185
R93 VS - 1.50	50	1464	411	20	549	100	326	460	1138	532	1173	737	436	255	386	255	442	221	449	550	464	M12	510	510	778	404	374	624	216	739	185
R93 VS - 1.65	65	1464	411	20	565	118	326	460	1138	532	1370	934	436	255	386	255	442	221	447	550	464	M12	510	510	887	404	483	843	290	739	185
R93 VS - 1.80	80	1464	411	20	579	132	326	460	1138	532	1405	969	436	255	386	255	442	221	447	550	464	M12	510	510	939	404	535	875	319	739	185
R93 VS - 1.100	100	1464	411	20	592	145	326	460	1138	532	1488	1052	436	255	386	255	442	221	447	550	464	M12	510	510	1046	404	642	942	379	739	185

\*DN = gas valves size

00



	DN*	Α	AA	В	BB	С	CC	D	E	F	FF	G	GG	н	HH	J	Κ	L	LL	М	MM	NN	0	Р	Q	R	S	U	V	W	Z
R515 VS - 1.50	50	1560	474	324	508	1236	565	1714	1071	643	275	483	275	516	258	494	750	595	700	M16	700	350	550	550	1009	404	605	843	216	970	270
R515 VS - 1.65	65	1560	474	324	508	1236	565	1692	1049	643	275	483	275	516	258	494	750	612	700	M16	700	350	550	550	887	404	483	843	290	987	270
R515 VS - 1.80	80	1560	474	324	508	1236	565	1727	1084	643	275	483	275	516	258	494	750	626	700	M16	700	350	550	550	939	404	535	875	319	1001	270
R515 VS - 1.100	100	1560	474	324	508	1236	565	1810	1167	643	275	483	275	516	258	494	750	639	700	M16	700	350	550	550	1046	404	642	942	379	1014	270
R520 VS - 1.50	50	1560	474	324	508	1236	565	1714	1071	643	275	483	275	516	258	494	750	595	700	M16	700	350	550	550	1009	404	605	843	216	970	270
R520 VS - 1.65	65	1560	474	324	508	1236	565	1692	1049	643	275	483	275	516	258	494	750	612	700	M16	700	350	550	550	887	404	483	843	290	987	270
R520 VS - 1.80	80	1560	474	324	508	1236	565	1727	1084	643	275	483	275	516	258	494	750	626	700	M16	700	350	550	550	939	404	535	875	319	1001	270
R520 VS - 1.100	100	1560	474	324	508	1236	565	1810	1167	643	275	483	275	516	258	494	750	639	700	M16	700	350	550	550	1046	404	642	942	379	1014	270
R525 VS - 1.65	65	1811	559	456	650	1355	565	1692	1049	643	275	556	275	600	300	494	750	612	700	M16	700	350	550	550	973	489	483	843	290	987	270
R525 VS - 1.80	80	1811	559	456	650	1355	565	1727	1084	643	275	556	275	600	300	494	750	626	700	M16	700	350	550	550	1025	489	535	875	319	1001	270
R525 VS - 1.100	100	1811	559	456	650	1355	565	1810	1167	643	275	556	275	600	300	494	750	639	700	M16	700	350	550	550	1132	489	642	942	379	1014	270

\*DN = gas valves size

### Performance curves



To get the input in kcal/h, multiply value in kW by 860.Data are referred to standard conditions: atmospheric pressure at 1013mbar, ambient temperature at 15°C.

NOTE: The performance curve is a diagram that represents the burner performance in the type approval phase or in the laboratory tests, but does not represent the regulation range of the machine. On this diagram the maximum output point is usually reached by adjsuting the combustion head to its "MAX" position (see paragraph "Adjusting the combustion head"); the minimum output point is reached setting the combustion head to its "MIN" position. During the first ignition, the combustion head is set in order to find a compromise between the burner output and the generator specifications, that is why the minimum output may be different from the Performance curve minimum.

### Pressure in the network - gas rate curves



Stm<sup>3</sup>/h



Caution: the gas rate value is quoted on the x-axis, the related network pressure is quoted on the y-axis (pressure value in the combustion chamber is not included). To know the minimum pressure at the gas train inlet, necessary to get the requested gas rate, add the pressure value in the combustion chamber to the value read on the y-axis.

# **MOUNTINGS AND CONNECTIONS**

### Packing

The burners are despatched wooden cages whose dimensions: **R91/92/93..VS: 1720**mm **x 1420**mm **x 1130**mm (L **x** P **x** H) **R515/R520..VS: 1690**mm **x 1360**mm **x 1310**mm (L **x** P **x** H) **R525..VS: 1960**mm **x 1460**mm **x 1310**mm (L **x** P **x** H) Packing cases of this kind are affected by humidity and are not suitable for stacking. The following are placed in each packing case: burner with gas train detached; gasket to be inserted between the burner and the boiler;

gasket to be inserted between the burner and the boiler; envelope containing this manual



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

To perform the installation, proceed as follows:

- 1 fix 4 holes on the boiler's door, according to the burner's drilling plate described on paragraph "Overall dimensions";
- 2 place the gasket on the burner's flange;
- 3 install the burner into the boiler;
- 4 fix the burner to the stud bolt, by means of the fixing nuts, according to Fig. 1.
- 5 After fitting the burner to the boiler, ensure that the gap between the blast tube and the refractory lining is sealed with appropriate insulating material (ceramic fibre cord or refractory cement).

### Key

- 1 Burner
- 2 Fixing nut
- 3 Washer
- 4 Sealing gasket
- 5 Stud bolt
- 7 Blast tube

### Fitting the burner to the boiler



CAUTION: pay attention to the burner mounting; all the blast tubes must get into the combustion chamber, going further than the inner side of the boiler fetling.



ATTENTION: Pay special attention to the burner mounting: all nozzles must go inside the combustion chamber, must extend beyond the inside of the boiler front wall. The burner is opened by means of a special hinge right/left joint: leave the space required for opening the air duct.

# Electrical wiring

Remove the cover of the burner electrical board. Effect the electrical connections to the supply terminal board as shown in the following diagrams, check the direction of the fan motor (see note at end of page) and refit the panel cover.Remove the cover of the burner electrical board. Effect the electrical connections to the supply terminal board as shown in the following diagrams, check the direction of the fan motor (see note at end of page) and refit the panel cover.Remove the cover of the burner electrical board. Effect the electrical connections to the supply terminal board as shown in the following diagrams, check the direction of the fan motor (see note at end of page) and refit the panel cover.



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.

ATTENTION: 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.



WARNING: The burner is provided with a jumper between terminals 6 and 7; in the event of connecting the high/low flame thermostat remove this jumper before connecting the thermostat.

IMPORTANT: while connecting electric supply wires to burner's teminal block be sure that ground wire should be longer than phase and neutral ones.

To execute the electrical connections, proceed as follows:

- 1 remove the cover from the electrical board, unscrewing the fixing screws;
- 2 execute the electrical connections to the supply terminal board as shown in the following diagrams,
- 3 check the direction of the fan motor (see next paragraph)
- 4 refit the panel cover.

# Rotation of fan motor

Once the burner's electrical connection is accomplished, remember to check the rotation of the fan motor. The motor should rotate in counterclockwise direction looking at motor's cooling fan. In case of incorrect rotation, reverse the three-phase supply and check again the rotation of the motor.

NOTE (exceptR525..VS): the burners are supplied for three-phase 400V supply, and in the case of three-phase 230V supply it is necessary to modify the electrical connections into the terminal box of the electric motor and replace the overload tripped relay.

# **GAS TRAIN CONNECTIONS**

The diagrams show the components of the gas train included in the delivery and which must be fitted by the installer. The diagrams are in compliance with the current laws.



**ATTENTION:** BEFORE EXECUTING THE CONNECTIONS TO THE GAS PIPE NETWORK, BE SURE THAT THE MANUAL CUTOFF VALVES ARE CLOSED. READ CAREFULLY THE "WARNINGS" CHAPTER AT THE BEGINNING OF THIS MANUAL.

Gas train with valves group VGD 20/40.. with built-in gas pressure governor + VPS504 gas proving system



### Key

- 1 Burner
- 2 Butterfly valve
- 3 Gas proving system
- 4 Maximum gas pressure switch (option)
- 5 Minimum gas pressure switch
- 6 Gas filter
- 7 Bellow joint
- 8 Manual cutoff valve
- 10 VGD Valves group
- 14 Pressure stabiliser with filter

\*Note: the maximum gas pressure switch can be mounted either upstream or downstream the gas valve but upstream the butterfly gas valve (see item no.4 in the scheme above).

# Assembling the gas grain

To assemble the gas train, proceed as follows:



Fig. 2 - Example of gas train

To mount the gas train, proceed as follows:

1-a) in case of threaded joints: use proper seals according to the gas used;

1-b) in case of flanged joints: place a gasket (no. 1A..1E - Fig. 11) between the elements

NOTE: the bellow joint, the manual cock and the gaskets are not part of the standard supply.

**ATTENTION:** once the gas train is mounted according to the diagram on Fig. 11, the gas proving test mus be performed, according to the procedure set by the laws in force.

The procedures of installation fo the gas valves are showed in the next paragraphs, according to the gas train used:

- threaded gas trains with Siemens VGD20..
- flanged gas trains with Siemens VGD40..

# Siemens VGD20.. and VGD40.. gas valves - with SKP2.. (pressure governor) Mounting

- When mounting the VGD.. double gas valve, two flanges are required (as for VGD20.. model, the flanges are threaded);
- to prevent cuttings from falling inside the valve, first fit the flanges to the piping and then clean the associated parts;
- install the valve;
- the direction of gas flow must be in accordance with the direction of the arrow on the valve body;
- ensure that the bolts on the flanges are properly tightened;
- ensure that the connections with all components are tight;
- make certain that the O-rings and gaskets between the flanges and the double gas valve are fitted.
- Connect the reference gas pipe (**TP** in figure; 8mm-external size pipe supplied loose), to the gas pressure nipples placed on the gas pipe, downstream the gas valves: gas pressure must be measured at a distance that must be at least 5 times the pipe size.

Leave the blowhole free (**SA** in figure). Should the spring fitted not permit satisfactory regulation, ask one of our service centres for a suitable replacement.



# Pressure adjusting range

The pressure adjusting range, upstream the gas valves group, changes according to the spring provided with the valve group. Keys



Performance range (mbar)	0 - 22	15 - 120
Spring colour	neutral	yellow

100 - 250

red

#### **Siemens SKP actuator**

Siemens VGD valves with SKP actuatorOnce the train is installed, connect electrically all its elements: gas valves group, pressure switches, gas proving system.



ATTENTION: once the gas train is mounted according to the diagram on Fig. 11, the gas proving test mus be performed, according to the procedure set by the laws in force.

# **ADJUSTMENTS**

ATTENTION: 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.

ATTENTION: 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 IMMEDIA-**TELY INVALIDATE!** 

∕∖

IMPORTANT! the combustion air excess must be adjusted according to the in the following chart:

Recommended combustion parameters										
Fuel	Recommended (%) CO <sub>2</sub>	Recommended (%) O <sub>2</sub>								
Natural gas	9 ÷ 10	3 ÷ 4.8								

# Combustion head gas pressure curves depending on the flow rate

### Curves are referred to pressure = 0mbar in the combustion head!

The curves referred to the gas pressure in the combustion head, depending on the gas flow rate, are referred to the burner properly adjusted (percentage of residual  $O_2$  in the flues as shown in the "Recommended combustion values" table and CO in the standard limits). During this stage, the combustion head, the gas butterfly valve and the actuator are at the maximum opening. Refer to Fig. 8, showing the correct way to measure the gas pressure, considering the values of pressure in combustion chamber, surveyed by means of the pressure gauge or taken from the boiler's Technical specifications.



Fig. 8

### Key

- 1 Generator
- 2 Pressure outlet on the combustion chamber
- 3 Gas pressure outlet on the butterfly valve
- 4 Differential pressure gauge

# Measuring the gas pressure in the combustion head

In order to measure the pressure in the combustion head, insert the pressure gauge probes: one into the combustion chamber's pressure outlet to get the pressure in the combustion chamber and the other one into the butterfly valve's pressure outlet of the burner. On the basis of the measured differential pressure, it is possible to get the maximum flow rate: in the pressure - rate curves (showed on the next paragraph), it is easy to find out the burner's output in  $Stm^3/h$  (quoted on the x axis) from the pressure measured in the combustion head (quoted on the y axis). The data obtained must be considered when adjusting the gas flow rate.

NOTE: THE PRESSURE-RATE CURVES ARE GIVEN AS INFORMATION ONLY; FOR A PROPER SETTING OF THE GAS RATE, PLEASE REFER TO THE GAS METER READING.

### Pressure - rate in combustion head curves



20

# Gas Filter

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

# Adjustments - brief description

Adjust the air and gas flow rates at the maximum output ("high flame") first, by means of the air damper and the adjusting cam respectively.

- Check that the combustion parameters are in the suggested limits.
- Check the flow rate measuring it on the counter or, if it was not possible, verifying the combustion head pressure by means of a differential pressure gauge, as described on par. see "Curve di pressione del gas in testa di combustione in funzione della portata-Curvas de presión en cabezal de combustión - caudal gasCombustion head gas pressure curves depending on the flow rateCOURBE DE PRESSION DU DÉBIT À LA TÊTE DE COMBUSTIONÊpêâûa äàâëaíêÿ â aîêîâa ñaîpàiêÿ â çàâèñèìîñòè îò pàñõîäà ăàçàDRUCK- UND DURCHSATZKURVEN AM BRENNERKOPFÊÁÌĐÕËÅÓ ĐÉÅÓÇÓ – ĐÁÑÏ×ÇÓ ÓÔÇÍ ÊÅÖÁËÇ ÊÁÕÓÇÓ" on page 72.
- Then, adjust the combustion values corresponding to the points between maximum and minimum: set the shape of the adjusting cam foil. The adjusting cam sets the air/gas ratio in those points, regulating the opening-closing of the throttle gas valve.
- Set, now, the low flame output, acting on the low flame microswitch of the actuator 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.

### Введение параметров пользователем.



WARNING: no adjustment must be made using the servo drives. In any case, never touch the red button on the actuators, otherwise certain parameters will be erased, fundamental for burner operation. The burner will be permanently inhibited in this case.

А теперь необходимо ввести рабочие параметы.

Для ввода данных, разрешенных пользователю, имеется доступ без пароля (См. "Ввод исходных значений температуры" на стр.17. Интерфейс пользователя мод. Siemens AZL используется для программирования электронного блока контроля мод. Siemens LMV и визуализации данных системы.

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 control box and monitoring the system data.



Описание устройства интерфейса:

1. дисплей: визуализирует меню и параметры

2. ESC (предыдущий уровень): чтобы вернуться в предыдущее меню и выйти из программирования данных без изменения последних

3. Клавиша ENTER (последующий уровень): для сохранения изменения параметра и перехода к меню/следующему параметру

4. клавиши SELECT: для выбора одной позиции меню и для изменения параметров.

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.

### 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  ${\bf C}$  and  ${\bf A},$  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
Ax1		VSD	0.0
Ax2		O2	
Ax3		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:

OperationalStat	
Operation	
ManualOperation	
Params & Display.	

Main menu

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

Normal operation	
Status/Reset	
Fault History	
Lockout History	

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:

1 Class:			05Gas
code	BF	Phase:	10
Diag.:	00	Lod:	0.0
Start No.			88

alternating by an error message as:

O2 control and	
limiter automat	
deactivated	

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

### 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.

### Lockout History

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

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

alternating by an error message as:ĸ

No flame at end		
of safety time		

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

### Setting the temperature set-point value

To set the temperature set-point value, that is the generator operating temperature; 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:

Cont	rlParamList
MinA	ctuatorStep
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.

# 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.

# 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.

### 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.

### 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.

# PGCP Gas leakage pressure switch (witn Siemens LDU burner control/Siemens LMV Burner Management System)

- 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.



#### **PART II: OPERATION**

#### LIMITATIONS OF USE

THE BURNER IS AN APPLIANCE DESIGNED AND CONSTRUCTED TO OPERATE ONLY AFTER BEING CORRECTLY CONNEC-TED TO A HEAT GENERATOR (E.G. BOILER, HOT AIR GENERATOR, FURNACE, ETC.), ANY OTHER USE IS TO BE CONSIDE-RED 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 AUTHORI-SED 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.

OPERATE ONLY THE MAIN SWITCH, WHICH THROUGH ITS EASY ACCESSIBILITY AND RAPIDITY OF OPERATION ALSO FUNCTIONS AS AN EMERGENCY SWITCH, AND ON THE RESET BUTTON.

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.

# OPERATION

ATTENTION: 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". Read carefully the "WARNINGS" chapter in this manual.

1 Turn to the "ON" position the main switch **A**, on the burner's control panel (see Fig. 29).

- 2 Check the flame control device is not locked (light **B**, on) and eventually release it by means of the pushbutton **C** (reset for more information about the device, please refer to the manual's Appendix).
- 3 Check the series of thermostats or pressure switches gives the burner the start signal for operating.
- 4 Check that the gas pressure in the gas network is sufficient (if the pressure is normal, the lamp **E** lights).
- 5 The check cycle of the gas proving system starts; the end of this check is signalled by the lamp on the device (see pag. 35). To unlock the system, press the reset pushbutton on the gas proving system.
- 6 During pre-purge, the LMV opens the EV1 valve for a few seconds. Via the gas pressure switch PGCP checks whether the pressure increases or remains constant. The LMV then completes the control cycle and gives permit signal to start the burner. Otherwise, the LMV blocks burner operation. In order to to unlock the tightness control box, press the PS unlock pushbutton on the electrical board burner.
- 7 At the end of the pre-purge phase, the air damper is moved to the ignition position (approx. 5°). The ignition transformer is activated and the two gas valves EV1 and EV2 are energised (signalled by the LF indicator see following figure). The LF indicator light (see the following figure).
- 8 The flame must form within a few seconds of opening the gas valves, otherwise the electronic control unit will be blocked. In this way, the burner is considered to be on and at the same time the servomotor goes to the high flame position and stops just above the low flame position.
- 9 The flame must form within a few seconds of opening the gas valves, otherwise the electronic control unit will be blocked. In this way, the burner is considered to be on and at the same time the servomotor goes to the high flame position and stops just above the low flame position.
- 10 A few seconds after opening the gas valves, the burner will enter automatic operation mode: it will automatically switch, depending on the heating system's requirements, to high or low flame.

#### PART III: 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.



1

**/**]'

# 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.

# PERIODICAL SERVICINGПЕРИОДИЧЕСКИ

- Cleaning and examining the gas filter cartridge, if necessary replace it (see next paragraphs).
- Removal, examination and cleaning of the combustion head (see Fig. 60)
- Check of ignition electrode, cleaning, adjustment and, if necessary, replacement (see page 66)
- Check of detection electrode, cleaning, adjustment and, if necessary, replacement; in case of doubt, check the detection circuit following the diagram in Fig. 64 and Fig. 66, after turning the burner back into operation.
- Cleaning and greasing of 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).







# Removing the combustion head

To dismantle the combustion head assembly, proceed as follows:

1 unscrew the four fixing screws securing the cap C from the rest of the burner: remove the cap



AR. Threaded rodB. Hinge holderCA. Air boxD. Standard nozzleGT. Combustion head group

- 2 unscrew the recessed screws that fix the adjustment ring G of the combustion head adjustment
- 3 unscrew the combustion head adjustment tube T



4 push the tube forward and then pull it out, pulling it towards you;





- 5 unscrew the 3 V screws which fasten the manifold;
- 6 remove the CO manifold;
- 7 locate the cable of the damaged electrode and remove it;



8 replace the CE cable and proceed to reassemble the burner, following all the steps in reverse order.



- 9 If it is necessary to service the combustion head, after removing the CO manifold, carry out the following operations:
- 10 unscrew the eight VA screws that fasten the CA air box;
- 11 open the CA air box;





12 remove the group of heads as indicated in the following figure; **ATTENTION:** do not remove the securing screws **VB** of the burner flange!





12

- 13 replace the cables, if damaged, observing the sequence of combustion heads indicated by the letters, glued on the electrode cables;
- 14 to remove the electrodes, loosen the fastening screws VE;
- 15 remove the E electrodes by separating them from the supports; replace the electrodes if they are damaged;





- 16 to remove the combustion head T remove the fastening screws VT;
- 17 remove the combustion head: to clean the combustion head, remove dirt with a hand hoover using Clean the combustion head: Clean the combustion head with a hand vacuum cleaner using the suction method, if there are hard deposits, remove them with a metal brush;
- 18 to replace the nozzles, proceed as follows: remove the recessed fixing screws VB and take out the damaged nozzle to replace it.
- 19 To replace the nozzles on the outer side, proceed as follows: Remove the recessed fixing screws VP screws recessed and remove the damaged nozzle for replacement. To replace the nozzles on the inside, proceed as follows: unscrew fixing screws VM and remove the plate holding the nozzles; replace replace the damaged nozzle(s).
- 20 When reassembling, carry out all operations in reverse order, paying particular attention to ensuring that the correct electrode positions.



ATTENTION: while replacing the manifold, remember to insert the "OR". While centering the heads, do not completely fasten the manifold screws at its base. Fasten the screws after centering. Do not act on the burner hinge and flange screws.

# Electrodes position adjustments



### Matching the combustion heads and the control boxes

The combustion head is modae of four heads: one is provided with Siemens QRA detection probe connected to the Siemens LFL control box (Fig. 57-Fig. 59-A); the other three heads are provided with Krom-Schroeder UVS5 probes, connected to the Krom-Schroeder IFW15 flame detectors (Fig. 57-Fig. 59-B-C-D).



-ig. 11



Fig. 12



Fig. 13



### Checking the detection current

To check the detection current follow the diagram on the following pictures. If the signal is less than the quoted value, check the position of the detector, the electrical contacts and, if necessary, replace the detector.

Minimum detection current: DC 6  $\mu$ A (Flame intensity on AZL display: 50%)

Minimum detection current: DC 85  $\mu A$  (Flame intensity on AZL display: 100%)





Control box	Minimum detection signal
Krom Schroeder IFW15	1µA

# Seasonal stop

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

- 1 turn the burner's main switch to 0 (Off position)
- 2 disconnect the power mains
- 3 close the fuel valve in 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".
### ДЕТАЛИРОВОЧНЫЙ ЧЕРТЕЖ ГОРЕЛКИ





	DESCRIPTION
1	REFERENCE ELECTRODE
2	IGNITION ELECTRODE
3	EARTH ELECTRODE
4	SUPPLY
5	SUPPLY
6	PROBE
7	GAS MANIFOLD
8	BURNER COMBUSTION HEAD
9	NOZZLE
10	HINGED BURNER SUPPORT
11	PLATE
12	GAS MANIFOLD SUPPORT
13	AIR BOX
14	IGNITION ELECTRODE CABLE
15	CONTROL ELECTRODE CABLE



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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 performed) 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



29

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

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

leacan

TYPE	MEDIO MEDIUM Ø OUTER	MEDIO MEDIUM WEIGHT	PRODOTTO ITEM CODE	Г	TYPE	MEDIO MEDIO MEDIUM Ø OUTER	MEDIO MEDIUM WEIGHT	PRODOTTO ITEM CODE
n° x mm²	mm	kg x km			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	1				
3x4 + 1G4	15,3	365,0	85803400	1				
3x6 + 1G6	17,4	497,0	B5803600					
3x10 + 1G10	20,6	730,0	B58031000					
3x16 + 1G16	24,8	1095,0	B58031600	111				
3x25 + 1G25	30,1	1680,0	B58032500	121				-
				10			(A. A.	1.1.1.
						100		(D.C.) (C)
						1520.01	- 1	
				2		1.1	- 10 A	
			22.1377			distant.		E112.284
						ALL 8. 7.8	1	
								1.14.14.21
						1000		
						11		
	-							
						1 C - 1		
						111111		
1000		2.25	-			1.4	15-98	1.5

# Annex 2 – Example for sensor cable

<b>CAVI TIPO "Li-YCY-P"</b> <b>A COPPIE SCHERMATI A TRECCIA</b> <b>IMPIEGO:</b> Cavi schermati per segnali e trasmissione dati applicazioni in elettronica ed informatica, efficaci contro le in renze elettromagnetiche ed atti ad offrire una protezione co influenze capacitive dovute a campi elettrici.	per STA nterfe- fr ontro effect pro	<b>CABLES TYPE "Li-YCY-P"</b> VISTED PAIRS, TINNED COPPER BRAID SHIELD NDARD USE: Signal and data transmission shielded cables or electronics and information technology applications, live against electromagnetic interferences and suited to offer tection against capacitive influences due to electric fields.
GUAINA JACKET SCHERMO SHIELD		CONDUTTORI CONDUCTORS ISOLAMENTO INSULATION SEPARATORE ASSEMBLING
CARATTERISTICHE TECNICHE		TECHNICAL FEATURES
CONDUTTORI; Flessibili in rame rosso sec. CEI 20-29 (IEC 228) CI. 5, VDE 0295 CI. 5, NF C32-013 (0,34 mm <sup>2</sup> : VDE 0295 CI.2)		CONDUCTORS: Flexible bare copper conductors CEI 20-29 (IEC 228) CI. 5, VDE 0295 CI. 5, NF C32-013 Ref. (0,34 mm <sup>2</sup> : VDE 0295 CI.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; Polyaster tape helically wound
SCHERMATURA: A treccia di rame stagnato Cordina di continuità a richiesta		<b>SHIELD:</b> Tinned copper braid On request with drain wire
GUAINA ESTERNA: Polivinileloruro (PVC) Sec. CEI 20-20 CI. TM2, VDE 0207 CI. YM2 colore: grigio (diverso a richiesta)		JACKET: PolyvinyIchloride (PVC) CEI 20-20 Cl. TM2, VDE 0207 Cl. YM2 Ref. colour: gray or on request
RESISTENZA ELETTRICA DEI CONDUTTORI: 0,14 mm <sup>2</sup> : <148 Ohm/Km 0,25 mm <sup>2</sup> : <79 Ohm/Km 0,34 mm <sup>2</sup> : <55 Ohm/Km 0,50 mm <sup>4</sup> : <39 Ohm/Km 0,75 mm <sup>2</sup> : <26 Ohm/Km 1mm <sup>2</sup> : <19,5 Ohm/Km	I	ELECTRICAL CONDUCTOR RESISTANCE:           0,14 mm?:         <148
TEMPERATURA DI ESERCIZIO: posa fissa: -25°C + 70°C posa mobile: -15°C + 70°C	°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	21	TEST VOLTAGE: 1500 V

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

#### CAVI TIPO "LI-YCY-P" A COPPIE SCHERMATI A TRECCIA



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



SURFACE TRANSFER IMPEDANCE:

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

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

CAPACITA' DI LAVORO:



PROVA N.P. FIAMMA:

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

max 200 mohm/m (f<10MHz)

CODICE	FORMAZIONE	ø esterno medio	Peso medio Kg/Km	CODICE	FORMAZIONE	ø esterno medio	Peso medio Kg/Km
CODE	TYPE	outer diameter ø	Medium weight Kg/Km	CODE	ΤΥΡΕ	outer diameter ø	Medium weight Kg/Km
28.204.1.02.1.000	2x2x0.14	5.6	40.0	28.204.1.02.4.000	2x2x0.34	7.3	68.0
28.204.1.03.1.000	3x2x0.14	5.9	47.0	28.204.1.03.4.000	3x2x0.34	7.8	82.0
28.204.1.04.1.000	4x2x0.14	6.2	61.0	28.204.1.04.4.000	4x2x0.34	8.6	96.0
28.204.1.05.1.000	5x2x0.14	7.2	68.0	28.204.1.05.4.000	5x2x0.34	10.0	110.0
28.204.1.06.1.000	6x2x0.14	7.6	76.0	28.204.1.06.4.000	6x2x0.34	10.6	130.0
28.204.1.07.1.000	7x2x0.14	7.6	82.0	28.204.1.07.4.000	7x2x0.34	10.6	145.0
28.204.1.08.1.000	8x2x0.14	8.4	90.0	28.204.1.08.4.000	8x2x0.34	11.5	150.0
28.204.1.10.1.000	10x2x0.14	9.8	118.0	28.204.1.10.4.000	10x2x0.34	13.0	190.0
28.204.1.12.1.000	12x2x0.14	10.2	130.0	28.204.1.12.4.000	12x2x0.34	13.5	220.0
28.204.1.16.1.000	16x2x0.14	11.2	160.0	28.204.1.16.4.000	16x2x0.34	15.2	250.0
28.204.1.18.1.000	18x2x0.14	11.7	186.0	28.204.1.18.4.000	18x2x0.34	16.0	275.0
28.204.1.20.1.000	20x2x0.14	12.4	200.0	28.204.1.20.4.000	20x2x0.34	17.1	290.0
28.204.1.25.1.000	25x2x0.14	14.0	273.0	28.204.1.25.4.000	25x2x0.34	19.5	400.0
28.204.1.02.3.000	2x2x0.25	5.8	54.0	28.204.1.02.5.000	2x2x0.50	7.6	75.0
28.204.1.03.3.000	3x2x0.25	7.0	65.0	28.204.1.03.5.000	3x2x0.50	9.0	125.0
28.204.1.04.3.000	4x2x0.25	7.3	89.0	28.204.1.04.5.000	4x2x0.50	10.0	140.0
28.204.1.05.3.000	5x2x0.25	8.0	99.0	28.204.1.05.5.000	5x2x0.50	10.8	160.0
28.204.1.06.3.000	6x2x0.25	9.0	114.0	28.204.1.06.5.000	6x2x0.50	11.7	190.0
28.204.1.07.3.000	7x2x0.25	9.0	120.0	28.204.1.07.5.000	7x2x0.50	11.7	220.0
28.204.1.08.3.000	8x2x0.25	9.6	126.0	28.204.1.08.5.000	8x2x0.50	14.0	250.0
28.204.1.10.3.000	10x2x0.25	10.3	160.0	28.204.1.10.5.000	10x2x0.50	15.0	300.0
28.204.1.12.3.000	12x2x0.25	11.4	171.0	28.204.1.12.5.000	12x2x0.50	15.7	345.0
28.204.1.16.3.000	16x2x0.25	13.1	238.0	28.204.1.16.5.000	16x2x0.50	17.6	450.0
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				

#### CAVI TIPO "LI-YCY-P" A COPPIE SCHERMATI A TRECCIA

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

CODICE	FORMAZIONE	ø esterno medio	Peso medio Kg/Km	CODICE	FORMAZIONE	ø esterno medio	Peso medio Kg/Km
CODE	TYPE outer Medium weight ( diameter ø Kg/Km		CODE	TYPE	outer diameter ø	Medium weight Kg/Km	
28.204.1.02.6.000	2x2x0.75	8.6	103.0	28.204.1.02.7.000	2x2x1	9.4	122.0
28.204.1.03.6.000	3x2x0.75	9.0	128.0	28.204.1.03.7.000	3x2x1	11.5	179.0
28.204.1.04.6.000	4x2x0.75	10.6	167.0	28.204.1.04.7.000	4x2x1	12.8	237.0
28.204.1.05.6.000	5x2x0.75	12.0	215.0	28.204.1.05.7.000	5x2x1	13.8	297.0
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				

# SIEMENS

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.

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.



LMV52.200...

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

# 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.



2 2 x SQM45... 6 1 x SQM45... + 1 x SQM48...

3 x SQM45...
2 x SQM45... + 1 x SQM48...
4 x SQM45...
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<sup>2</sup>) and curve ① (2 x SQM45...) gives a maximum cable length of 33.4 m between the transformer and the group of actuators.



Note on example 1

Total length of CAN bus cable  $\leq$  100 m

.

#### Example 2

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



#### Notes on example 2

#### Total length of CAN bus cable $\leq$ 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...



#### 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.

41/45

# 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.





# QGO20...

Istruzioni di montaggio Asennusohje Instrucciones de montaje Monteringsinstruktion Montasjeanvisning

Montageanleitung Mounting instruction Instruction de montage Monteringsanvisning Montage-aanwijzing



#### 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 (+)	Signal Temperaturkompensations-
G2 (-)	Speisung Temperaturkompensations- element
GND	Masse für Anschirmung
3 x 1,5 mn Q4 Q5	n <sup>2</sup> : Fühlerheizung (AC 230 V) Fühlerheizung (AC 230 V)





**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 (+)	Signal from temperatue
G2 (-)	Power supply for temperature compensation element
GND	Ground for screening
3 x 1,5 mm Q4 Q5	1 <sup>2</sup> : QGO detector heating (AC 230 V) QGO detector heating (AC 230 V)





**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 (+)	Signal de l'élément de cpmpensation de température
G2 (-)	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<sup>\*</sup>



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.
- Spannung an Q4 Q5 muss im 2 s Takt pulsieren.
- <u>Sofort auschalten</u> falls Spannung nicht pulsiert PRPO 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 must pulsate at 2-s intervals
- If voltage does not pulsate, <u>switch equipment off</u> immediately
  - 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 doivent commuter toutes les 2 s.
- <u>Déconnecter immédiatement</u> en cas de noncommutation des tensions
   Echanger le RPO



### 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)

# Technical Data PLL52...

Refer to chapter Technical Data!					
Mains voltage «X89-01»	AC 120 V –15 % / +10 %	AC 230 V -15 % / +10 %			
Safety class	I with parts accord	ling to II			
	as per DIN EN 60	/30-1			
Mains frequency	50 / 60 Hz ±6 %				
Power consumption	Ca. 4 VA	Ca. 4 VA			
Degree of protection	IP54, housing clos	ed			
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)				
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.				
	Refer to chapter Technical Data!         Mains voltage «X89-01»         Safety class         Mains frequency         Power consumption         Degree of protection         Transformer AGG5.210         -         Primary side         -       Secondary side         Transformer AGG5.220         -       Primary side         -       Secondary side         Storage         Climatic conditions         Mechanical conditions         Temperature range         Humidity         Transport         Climatic conditions         Mechanical conditions         Temperature range         Humidity         Operation         Climatic conditions         Mechanical conditions         Temperature range         Humidity	Refer to chapter Technical Data!         Mains voltage «X89-01»       AC 120 V         -15 % / +10 %         Safety class       I with parts accord as per DIN EN 60         Mains frequency       50 / 60 Hz ±6 %         Power consumption       Ca. 4 VA         Degree of protection       IP54, housing clos         Transformer AGG5.210       -         -       Primary side         -       Secondary side			

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

# Terminal ratings, cable lengths and crosssectional areas

#### LMV52... basic unit

PLL52...

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

Cable lengths / cross-sectional areas	
Electrical connection «X89»	Screw terminals up to max. 2.5 mm <sup>2</sup>
Cable lengths	≤10 m to QGO20
Cross-sectional areas	Refer to description of QGO20
	Twisted pairs
Analog inputs:	
Analog inputs: Fresh air temperature detector	Pt1000 / LG-Ni1000
Analog inputs: Fresh air temperature detector Flue gas temperature detector	Pt1000 / LG-Ni1000 Pt1000 / LG-Ni1000
Analog inputs: Fresh air temperature detector Flue gas temperature detector QGO20	Pt1000 / LG-Ni1000 Pt1000 / LG-Ni1000 Refer to Data Sheet N7842
Analog inputs: Fresh air temperature detector Flue gas temperature detector QGO20 Interface	Pt1000 / LG-Ni1000 Pt1000 / LG-Ni1000 Refer to Data Sheet N7842 Communication bus for LMV52

240/253

![](_page_59_Figure_0.jpeg)

# **KOSTAL INVERTER**

Connection and programming for electronically controlled burners with

# LMV2x/3x, LMV5x, ETAMATIC and INVERTER regulation

![](_page_60_Picture_3.jpeg)

Service Manual TECHNICAL INSTRUCTIONS

#### Table of contents:

**INVERTER** identification, 3

User interface communication (on request), 4

Electrical connections, 5

Motor connection variants for INVERTERS sizes A, B and C, 5

Motor connection variants for INVERTER size D, 6

Connection of INVERTER signals and commands, 7

Electrical connections and parameter configuration, 7

0-10V / 4-20mA analogue input configuration, 8

Configuration of control contact / INVERTER starting and stopping, 9

Configuration of INVERTER start / stop parameters and operating mode, 10

Motor data, 11

Output signal variant for reading motor rpm (optional), 12

Brake chopper connections, 14

Burner terminal with INVERTER interface, 16

#### IDENTIFICAZIONE INVERTER

<b>INVEOR Mx</b>	IVxx	<b>PWxx</b>	LPxx	APxx	GHxx	DKxx	COxx 1	1
								Ι

	1	2	3	4	5		6	7	8	9	10
	Key						Key				
1 Drive controller series: INVEOR						6	Applicatio AP12 - St AP13 - CA	n circuit board andard ANopen			
2	2 Installation location/size: motor-integrated - M,size: α, A, B, C, D						Control: DK01 - St DK04 – W	andard (withou /ith membrane	it membrane keypad	keypad)	
3	Input voltage : IV02 - 230 V					8	Housing : GH10 – st	andard heat sir	nk (black pain	ited)	
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 : CO00 - St CO01 - St	version andard pecific			
5	Printed circ : LP01 / LP0 LP02 / LP0	uit boards 3 – Standar 4 – Standar	d (without bra d (with brake	ake chopper); e chopper);		10	Equipmen	it generation: 1	– current ve	rsion	

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

![](_page_62_Picture_5.jpeg)

### User interface COMMUNICATION (on request)

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

![](_page_63_Picture_2.jpeg)

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.	CO OC
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.	Available on the 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

![](_page_64_Figure_3.jpeg)

#### Motor connection variants for INVERTER size D

![](_page_65_Figure_1.jpeg)

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

![](_page_65_Figure_7.jpeg)

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

![](_page_66_Figure_1.jpeg)

#### 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.

![](_page_66_Figure_6.jpeg)

Parame	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

![](_page_67_Figure_1.jpeg)

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.

		Specifies the input type, whether voltage or current.
4.020	Input type AI1	1= Voltage input 0-10V (LMV2x/3x)
		2= Current input 0/4-20mA (LMV5 ETAMATIC)
		Specifies the minimum value of the analogue input as a percentage of the range.
		E.g.:
4.021	AI1 Standard low	010 V or 020 mA = 0 %100 %
		210 V or 420 mA = 20 %100 %
		Set value = 20% for LMV2x/3x, LMV5x, ETAMATIC
		Specifies the maximum value of the analogue input as a percentage of the range at
4.022	Al1 Standard high	10V of 20mA.
		Set value - 100%
4.023	AI1 Response time	Specifies the deadband on the input signal.
		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.
4.024	AI1 Filter time	Set value = 4 seconds
4 030	All Input function	Specifies whether the input is 0 = analogue / 1 = digital input.
4.000		Set value = 0 analogue
4.033	Al1 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 (%) Specifics the time after which the fault appears if input A11 is interrupted (wire break)
4 036	Al1 Wire break time 5s	Set value = 5 seconds
4.000		
		Inverte the signal of input 1
4.037	Al1 Inversion	Set value = $0$ (disabled)

![](_page_68_Figure_1.jpeg)

Terminal	
X5-3 (24V Out) X5-6 (Digit In1)	Bringing 24V to terminal <b>X5-6</b> enables INVERTER operation and the contact that switches it on/off. On LMV2/3x <b>X5-3</b> (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

Parame	ter	
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 Al1. 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.

Parame	ter	
33.001	Motor type	Selection of motor type. Set value = 1 (asynchronous motor)
33.010	Motor I <sup>2</sup> t factor	Not used. Only for encoders. Set value = 100%
33.011	I <sup>2</sup> t 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 <b>Set value = 100%</b>
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.

Aprire	F Salva	Co	tlegamento	🖆 Scrittura	û Lettura	Parametro	Valori istantanei	Errori / Avvertimento	Sistema di controllo	Oscillosi
Compiti ×	1									
Cockpit										
Parametro	📥 D	Dati mot	tore						Identificazione mot	ore
III Tutti i parametri										
Param.base	N	umero	N	оте		Valore		Acquisiz	ione	
🖽 Modalità oper.	33.0	01	Tipo di motore		1: Motore asincrono			Pronto		
Regol.processo	33.0	10	Fat. I2T motore		100 %			Sempre		
	33.0	11	I2T Tempo		30 s			Sempre		
Controllo mors.	33.0	15	Ott.rest.stat.		100 %			Pronto		
Funz.aggiuntive	33.0	16	Monit.fasi mot.		1: Attivo			Pronto		
Param.campo Bus	33.0.	31	Corrente motor	e	4.4 A		and the second second	Pronto		
Detfinisterer	33.0.	32	Potenza motore		2 200 W			Pronto		
Dati motore	33.0	34	Velocità motore		2 910 rpm			Pronto		
Param. regolaz.	33.0	35	Frequen.motore	•	50 Hz			Pronto		
E Chopper fren.	33.0	50	Resist.statore		0.22 Ohm			Pronto		
	33.1	05	Indut.dispers.		0.001 312 256 H			Pronto		
Hunz.protezione	33.1	10	Tensione motor	e	400 V			Pronto		
Valori istantanei	33.1	11	cosphi motore		0.84			Pronto		
Errori / Avvertimento	33.1	38	Tem.cor.riten.		0 s			Sempre		
Sistema di controllo Oscilloscopio										

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 T <sub>N</sub>	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 <b>1</b> the function is enabled. If set to <b>0</b> 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. <b>Set value = 1 (compensation for slippage)</b>

#### 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:

Param	eter		
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 = <b>580</b> , 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 <b>34.090</b> and <b>34.091</b> by increasing them, in particular parameter <b>34.090</b> , in steps of 100mA/rad/sec.		
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NOTE 2	With LMV 2x/3x with INVERTER control, the device controls the standby rpm with <b>param. 653</b> . If, after the fan is switched off, the device LMV 2x/3x sees that the motor continues to run, error <b>83</b> diagnostic <b>32</b> 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 <b>0</b> .		
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	В-	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 LMV5x o ETAMATIC





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