

E115X E140X E190X

LMV 2x/3x Microprocessor controlled

Gas burners

MANUAL OF INSTALLATION - USE - MAINTENANCE

CIB UNIGAS

BURNERS - BRUCIATORI - BRULERS - BRENNER - QUEMADORES - ГОРЕЛКИ

M039532CC 0.0 03/2022

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.

1) GENERAL INTRODUCTION

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

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

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

Contact qualified personnel only.

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

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

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

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

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

2) SPECIAL INSTRUCTIONS FOR BURNERS

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

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

- a Remove the power supply by disconnecting the power cord from the mains.
- b Disconnect the fuel supply by means of the hand-operated shut-off 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.

3) GENERAL INSTRUCTIONS DEPENDING ON FUEL USED 3a) 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.

3b) FIRING WITH GAS, LIGHT OIL OR OTHER FUELS GENERAL

- 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;
- 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.

Precautions if you can smell gas

- a do not operate electric switches, the telephone, or any other item likely to generate sparks;
- b immediately open doors and windows to create an air flow to purge the room;
- c close the gas valves;
- d contact qualified personnel.
- Do not obstruct the ventilation openings of the room where gas appliances are installed, to avoid dangerous conditions such as the development of toxic or explosive mixtures.

DIRECTIVES AND STANDARDS

Gas burners

- European directives
- -Regulation 2016/426/UE (appliances burning gaseous fuels)
- -2014/35/UE (Low Tension Directive) -2014/30/UE (Electromagnetic compatibility Directive)
- -2006/42/EC (Machinery Directive)

Harmonized standards

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

Light oil burners

European directives

-2014/35/UE (Low Tension Directive) -2014/30/UE (Electromagnetic compatibility Directive)

-20014/30/DE (Electromagnetic compatibility Directive -2006/42/EC (Machinery Directive)

Harmonized standards

-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);

Heavy oil burners

European Directives

-2014/35/UE (Low Tension Directive)

-2014/30/UE (Electromagnetic compatibility Directive)

-2006/42/EC (Machinery Directive)

Harmonized standards

-UNI EN 267(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);

Gas - Light oil burners

European Directives

-Regulation 2016/426/UE (appliances burning gaseous fuels)

-2014/35/UE (Low Tension Directive) -2014/30/UE (Electromagnetic compatibility Directive)

-2006/42/EC (Machinery Directive)

Harmonized standards

-UNI EN 676 (Automatic forced draught burners for gaseous fuels)

-UNI EN 267(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);

Gas - Heavy oil burners

European directives:

-Regulation 2016/426/UE (appliances burning gaseous fuels) -2014/35/UE (Low Tension Directive)

-2014/30/UE (Electromagnetic compatibility Directive)

-2006/42/EC (Machinery Directive)

Harmonized standards

-UNI EN 676 (Automatic forced draught burners for gaseous fuels)

-EN 55014-1 (Electromagnetic compatibility- Requirements for house hold appliances, electric tools and similar apparatus)

-EN 60204-1:2006 (Safety of machinery – Electrical equipment of machines.)

-CEI EN 60335-1 (Specification for safety of household and similar electrical appliances);

-CEI EN 60335-2-102 (Household and similar electrical appliances. Safety. Particular requirements for gas, oil and solid-fuel burning appliances having electrical connections).

-UNI EN ISO 12100:2010 (Safety of machinery - General principles for design - Risk assessment and risk reduction);

Industrial burners

European directives

-Regulation 2016/426/UE (appliances burning gaseous fuels) -2014/35/UE (Low Tension Directive) -2014/30/UE (Electromagnetic compatibility Directive)

-2006/42/EC (Machinery Directive)

Harmonized standards

-EN 55014-1 (Electromagnetic compatibility- Requirements for house hold appliances, electric tools and similar apparatus)

-EN 746-2 (Industrial thermoprocessing equipment - Part 2: Safety requirements for combustion and fuel handling systems)

-UNI EN ISO 12100:2010 (Safety of machinery - General principles for design - Risk assessment and risk reduction);

-EN 60204-1:2006 (Safety of machinery – Electrical equipment of machines.)

-EN 60335-2 (Electrical equipment of non-electric appliances for household and similar purposes. Safety requirements)

Burner 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)

WARNING!

 information about fuel type and network pressure
Protection



SYMBOLS USED

Failure to observe the warning may result in irreparable damage to the unit or damage to the environment



Failure to observe the warning may result in serious injuries or death.



Failure to observe the warning may result in electric shock with lethal consequences

Figures, illustrations and images used in this manual may differ in appearance from the actual product.

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.

Residual risks deriving from misuse and prohibitions

The burner has been built in order to make its operation safe; there are, however, residual risks.



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

vided for in the data plate. Do not use fuels other than the ones stated. Do not use the burner in potentially explosive environ-

ments. Do not remove or by-pass any machine safety devices. Do not remove any protection devices or open the burner or any other component while the burner is running. Do not disconnect any part of the burner or its components while the burner is running.

Untrained staff must not modify any linkages.



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



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

PART I: SPECIFICATIONS

BURNERS FEATURES



Note: the figure is indicative only

1 Control panel with startup switch

- 2 Gas train
- 3 Electrical panel
- 4 Cover
- 5 Blast tube + Combustion head
- 6 Flange
- 7 Silencer
- 8 Actuator
- 9 Air pressure switch
- 10 Combustion head adjusting ring nut

Gas operation: From the supply line the gas fuel passes through the gas train (filter, safety valves, gas pressure regulator and butterfly valve). The pressure regulator sets the gas pressure within the combustion head utilization limits. Air is supplied by a fan, which may be onboard or separated depending on burner configuration, and is channeled through an air damper.

The air damper and the gas butterfly valve are actuated by servomotors according to load curves, in order to achieve the correct proportion between fuel and air flows, and to optimize flue gas parameters.

The adjustable combustion head can improve the burner performance by controlling the flame geometry and combustion efficiency.

Fuel and air are routed through separated channels inside the combustion head, then mixed to ignite the flame inside the combustion chamber. The ignition spark is provided by electrodes and a high voltage transformer (a pilot flame may also be employed, depending on burner configuration).

Pre-ventilation of the combustion chamber is usually implemented according to gas directives.

The control panel, onboard or separated, allows the operator to monitor each operating phase.

Burner model identification

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

Туре	E115X	Model	М	MD.	SR.	*.	Α.	1.	80.	EA
	(1)		(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)

1	BURNER TYPE	E115X, E140X, E190X
2	FUEL	M - Natural gas
		L - LPG
		B - Biogas
		C - Town gas
3	OPERATION (Available versions)	PR - Progressive
		MD - Fully modulating
4	BLAST TUBE AND AIR INLET CONFIGURATION	SR = Standard blast tube + ABS polymer (silenced) air intake
	(see the figure on page 5)	SP = Standard blast tube + aluminium air intake
		LR = Extended blast tube + ABS polymer (silenced) air intake
		LP = Extended blast tube + aluminium air intake
5	DESTINATION COUNTRY	* - see data plate
6	BURNER VERSION	A - Standard
		Y - Special
7	EQUIPMENT	0 = 2 gas valves
		1 = 2 gas valves + gas proving system
		7 = 2 gas valves + maximum gas pressure switch
		8 = 2 gas valves + gas proving system + maximum gas pressure switch
8	GAS CONNECTION	32 = Rp1 _{1/4}
	see Specifications	$40 = \text{Rp1}_{1/2}$ 50 = Rp2
		65 = DN65 80 = DN80
		100 = DN100
9	MICRO-PROCESSOR CONTROL	EA = micro-processor control, without inverter
		EB = micro-processor control, with inverter

Fuel

The burner technical specifications, described in this manual, refer to natural gas (calorific net value Hi = 9.45 kWh/Stm³, density ρ = 0.717 Kg/Stm³) and LPG (calorific net value Hi = 26.79 kWh/Stm³, density ρ = 2.151 Kg/Stm³). For different fuel such as town gas and biogas, multiply the values of flow and pressure by th corrective factors shown in the table below.

Fuel	Hi (KWh/Stm ³)	ρ (kg/Stm ³)	f _Q	f _p
Town gas	4,88	0,6023	1,936	3,3
Biogas	6,395	1,1472	1,478	3,5
LPG	26,79	2,151	0,353	0,4

For example, to obtain the flow and pressure values for the biogas:

 $Q_{biogas} = Q_{naturalGas} \cdot 1,478$

 $p_{biogas} = p_{naturalGas} \cdot 3, 5$



ATTENTION! The combustion head type and the settings depend on the fuel. The burner must be used only for its intended purpose specified in the burner data plate .



ATTENTION: the corrective factors in the above table depend on the gas composition, so on the calorifc value and the density of the gas. The above value can be taken only as reference.

Technical Specifications

BURNER TYPE		E115X M	E140X M	E190X M	E115X L	E140X L	E190X L	
Output	min max. kW	300 - 1.150	290 - 1.400	360 - 1.900	300 - 1.150	290 - 1.400	360 - 1.900	
Fuel			Natural gas LPC					
Category		(see	e next paragra	aph)		I _{3B/P}		
Gas flow rate	minmax. Stm3/h	32 - 122	31 - 148	38 - 201	11,2 - 43	10,8 - 52	13,4 - 71	
Gas pressure	minmax. mbar			(see N	lote 2)			
Power supply				230V 3~ / 400)V 3N ~ 50H:	Z		
Total power consumption	kW	2,7	2,7	3,5	2,7	2,7	3,5	
Fan motor power consumption	kW	2,2	2,2	3,0	2,2	2,2	3,0	
Protection			•	IP	40	•	•	
Approx. weight	kg	80 - 115	80 - 115	80 - 115	80 - 115	80 - 115	80 - 115	
Operation			P	rogressive - F	ully modulati	ng		
Valves size / Gas connection - 40				1" _{1/2} /	Rp1 _{1/2}			
Valves size / Gas connection - 50				2" /	Rp2			
Valves size / Gas connection - 65				2" _{1/2} /	DN65			
Valves size / Gas connection - 80				3"/[DN80			
Operating temperature	°C			-10 ÷	- +50			
Storage Temperature	°C			-20 ÷	- +60			
Working service (*)				Intern	nittent			

(*) NOTE ON THE BURNER WORKING SERVICE: LMV2x automatically stops after 24h of continuous working. The device immediately starts up, automatically. LMV3x performs countinuous operation.

Note1:	All gas flow rates are referred to Stm ³ / h (1.013 mbar absolute pressure, 15 °C temperature) and are valid for G20 gas (net calorific value $H_i = 34,02 \text{ MJ}$ / Stm ³); for L.P.G. (net calorific value $H_i = 93,5 \text{ MJ}$ / Stm ³)
Note2:	Maximum gas pressure = 360 mbar (with Dungs MBDLE) = 500 mbar (with Siemens VGD or Dungs MultiBloc MBE) Minimum gas pressure = see gas curves.
Note3:	Burners are suitable only for indoor operation with a maximum relative humidity of 80 %

Gas categories and countries of application

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

Fuel



DANGER! The burner must be used only with the fuel specified in the burner data plate.





E115X - E140X - E190X





Boiler recommended drilling template and burner flange

B*: SPECIAL blast tube lengths must be agreed with Cib Unigas

	DN(*)	AA	A _S	AL	BB	B _S	BL	С	СС	D	E	F	G	н	J	К	L	М	N	O _{MIN}	O _{MAX}	Р	Q	R	S	U	V(**)	w	Y	Z
	40	69	1097	1182	372	305	390	758	352	996	634	362	219	249	233	300	453	M10	330	216	250	233	457	130	327	541	-	608	210	155
5X	50	69	1097	1182	372	305	390	758	352	996	634	362	219	249	233	300	453	M10	330	216	250	233	472	130	342	526	-	608	210	155
<u>.</u>	65	69	1097	1182	372	305	390	758	352	1080	718	362	219	249	233	300	453	M10	330	216	250	233	562	130	432	593	292	608	210	155
_	80	69	1097	1182	372	305	390	758	352	1054	692	362	219	249	233	300	453	M10	330	216	250	233	558	130	428	565	310	608	210	155
	40	69	1192	1258	372	400	500	758	352	996	634	362	259	280	233	300	453	M10	330	216	250	233	457	130	327	541	-	608	210	155
õ	50	69	1192	1258	372	400	500	758	352	996	634	362	259	280	233	300	453	M10	330	216	250	233	472	130	342	526	-	608	210	155
14	65	69	1192	1258	372	400	500	758	352	1080	718	362	259	280	233	300	453	M10	330	216	250	233	562	130	432	593	292	608	210	155
_	80	69	1192	1258	372	400	500	758	352	1054	692	362	259	280	233	300	453	M10	330	216	250	233	562	130	432	565	310	608	210	155
	40	69	1192	1292	403	400	500	758	352	996	634	362	259	280	235	300	453	M10	330	216	250	233	457	130	327	541	-	608	210	155
Ň	50	69	1192	1292	403	400	500	758	352	996	634	362	259	280	235	300	453	M10	330	216	250	233	472	130	342	526	-	608	210	155
13	65	69	1192	1292	403	400	500	758	352	1080	718	362	259	280	235	300	453	M10	330	216	250	233	562	130	432	593	210	608	210	155
_	80	69	1192	1292	403	400	500	758	352	1054	692	362	259	280	235	300	453	M10	330	216	250	233	558	130	428	565	210	608	210	155

BS = standard blast tube BL = long blast tube DN = gas valves size



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(**) According to the gas train size and the burner type, MB-DLE or VGD valves are supplied. The "V" measure, refers to the gas filter, for burners provided with Siemens VGD valves. MB-DLE valves have a built-in filter.

Overall dimensions (mm)





Р

ØH



(**) According to the gas train size and the burner type, MB-DLE or VGD valves are supplied. The "V" measure, refers to the gas filter, for burners provided with Siemens VGD valves. MB-DLE valves have a built-in filter.

Burner flange

B*: SPECIAL blast tube lengths must be agreed with Cib Unigas

TIPO	DN	A (AS)	A (AL)	AA	AD	B (BS)	B (BL)	BB	С	сс	D	Е	F	G	н	J	к	L	м	N	Omin	Omax	Ρ	Q	R	S	U	v	w	Y	z
	1.40	1169	1253	69	28	309	390	369	830	352	679	679	333	219	249	235	300	420	M10	330	220	250	233	*	127	325	569	х	575	210	155
15X	1.50	1169	1253	69	28	309	390	369	830	352	969	969	333	219	249	235	300	420	M10	330	220	250	233	*	127	338	529	х	575	210	155
E11	1.65	1169	1253	69	28	309	390	369	830	352	1002	1002	333	219	249	287	300	420	M10	330	220	250	233	275	127	406	565	292	575	210	155
_	1.80	1169	1253	69	28	309	390	369	830	352	1082	1082	333	219	249	287	300	420	M10	330	220	250	233	284	127	692	565	310	575	210	155
	1.40	1264	1364	69	28	400	500	369	830	352	679	679	333	259	280	235	300	420	M10	330	220	250	233	*	127	325	569	Х	575	210	155
XO1	1.50	1264	1364	69	28	400	500	369	830	352	969	969	333	259	280	235	300	420	M10	330	220	250	233	*	127	338	529	Х	575	210	155
E14	1.65	1264	1364	69	28	400	500	369	830	352	1002	1002	333	259	280	287	300	420	M10	330	220	250	233	275	127	406	565	292	575	210	155
_	1.80	1264	1364	69	28	400	500	369	830	352	1082	1082	333	259	280	287	300	420	M10	330	220	250	233	284	127	692	565	310	575	210	155
	1.40	1264	1364	69	28	400	500	403	830	352	679	679	333	259	280	235	300	420	M10	330	220	250	233	*	127	325	569	Х	575	210	155
X0	1.50	1264	1364	69	28	400	500	403	830	352	969	969	333	259	280	235	300	420	M10	330	220	250	233	*	127	338	529	Х	575	210	155
E19	1.65	1264	1364	69	28	400	500	403	830	352	1002	1002	333	259	280	287	300	420	M10	330	220	250	233	275	127	406	565	292	575	210	155
	1.80	1264	1364	69	28	400	500	403	830	352	1082	1082	333	259	280	287	300	420	M10	330	220	250	233	284	127	692	565	310	575	210	155

9

How to read the burner "Performance curve"

To check if the burner is suitable for the boiler to which it must be installled, the following parameters are needed:

- furnace input, in kW or kcal/h (kW = kcal/h/860);
- backpressure (data are available on the boiler ID plate or in the user's manual).

Example:

Furnace input: 600kW

Backpressure: 4 mbar

In the "Performance curve" diagram, draw a vertical line matching the furnace input value and an horizontal line matching the backpressure value. The burner is suitable if the intersection point A is inside the performance curve.

Data are referred to standard conditions: atmospheric pressure at 1013 mbar, ambient temperature at 15° C.

Checking the proper gas train size

To check the proper gas train size, it is necessary to the available gas pressure value upstream the burner's gas valve. Then subtract the backpressure. The result is called **pgas.** Draw a vertical line matching the furnace input value (600kW, in the example), quoted on the x-axis, as far as intercepitng the network pressure curve, according to the installed gas train (DN65, in the example). From the interception point, draw an horizontal line as far as matching, on the y-axis, the value of pressure necessary to get the requested furnace input. This value must be lower or equal to the **pgas** value, calculated before.

Performance Curves



(mbar) 7 6 backpressure in combustion chamber (r 5 4 3 2 1 0 -1 100 200 300 400 500 600 700 800 900 Power kW







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 adjusting 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 flow rate curves(natural gas)



Gas rate Stm³/h



0 +

WARNING: the diagrams refers to natural gas. For different type of fuel please refer to the paragraph "Fuel" at the beginning of this chapter.

Combustion head gas pressure curves

Combustion head gas pressure depends on gas flow and combustion chamber backpressure. When backpressure is subtracted, i depends only on gas flow, provided combustion is properly adjusted, flue gases residual O2 percentage complies with "Recommendec 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 , showing the correct way to measure the gas pressure, considering the values o pressure in combustion chamber, surveyed by means of the pressure gauge or taken from the boiler's Technical specifications.



Note: the figure is indicative only.

Key

1 Generator

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

ATTENTION: THE BURNED GAS RATE MUST BE READ AT THE GAS FLOW METER. WHEN IT IS NOT POSSIBLE, THE USER CAN REFERS TO THE PRESSURE-RATE CURVES AS GENERAL INFORMATION ONLY.

Measuring 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 Stm³/h (quoted on the x axis) from the pressure measured in the combustion data obtained must be considered when adjusting the gas flow rate.

Pressure - rate in combustion head curves (natural gas)

A c

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

Pressure - rate in combustion head curves (natural gas)



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





MOUNTING AND CONNECTING THE BURNER

Transport and storage



ATTENTION! The equipment must be installed in compliance with the regulations in force, following the manufacturer's instructions, by qualified personnel. All handling operations must be carried out with appropriate resources and qualified personnel



ATTENTION: Use intact and correctly dimensioned hoisting equipment, conforms to the local regulations and health and safety regulations. Do not stand under lifted loads.

If the product must be stored, avoid humid and corrosive places. Observe the temperatures stated in the burner data table at the beginning of this manual. The packages containing the burners must be locked inside the means of transport in such a way as to guarantee the absence of dangerous movements and avoid any possible damage.

In case of storage, the burners must be stored inside their packaging, in storerooms protected from the weather. Avoid humid or corrosive places and respect the temperatures indicated in the burner data table at the beginning of this manual.

Packing

Burners are despatched in cardboard packages whose dimensions are:

• 1636mm x 1036mm x 1016mm (L x P x H).

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

The following are placed in each packing case:

- burner with detached gas train;
- gasket or ceramic fibre plait (according to burner type) to be inserted between the burner and the boiler;
- (if provided) detection photoelement deatached from the burner
- envelope containing this manual and other documents.

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

P

Н

Handling the burner



WARNING! The handling operations must be carried out by specialised and trained personnel. If these operations are not carried out correctly, the residual risk for the burner to overturn and fall down still persists. To move the burner, use means suitable to support its weight (see paragraph "Technical specifications").

Fitting the burner to the boiler

To install the burner into the boiler, proceed as follows:

make a hole on the closing door of the combustion chamber as described on paragraph "Overall dimensions")

place the burner to the boiler: lift it up and handle it according to the procedure described on paragraph "Handling the burner";

place the 4 stud bolts (5), according to the burner's drilling plate described on paragraph "Overall dimensions";

fasten the 4 stud bolts;

place the ceramic fibre plait on the burner flange;

install the burner into the boiler;

fix the burner to the stud bolts, by means of the fixing nuts, according to the next picture.

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).



The burner is designed to work positioned according to the picture below. For different installations, please contact the Technical Department.



Matching the burner to the boiler (low NOx burners)

The burners described in this manual have been tested with combustion chambers that comply with EN676 regulation and whose dimensions are described in the diagram. In case the burner must be coupled with boilers with a combustion chamber smaller in diameter or shorter than those described in the diagram, please contact the supplier, to verify that a correct matching is possible, with respect of the application involved. To correctly match the burner to the boiler verify the type of the blast tube. 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. To choose the blast tube lenght consider the following rule, even if it differs from the instructions of the boiler manufacturer: Cast-iron boilers, three pass flue boilers (with the first pass in the rear part): the blast tube must protrude at least 150+200 mm into the combustion chamber. The length of the blast tubes does not always allow this requirement to be met, and thus it may be necessary to use a suitably-sized spacer to move the burner backwards.





WARNING! Carefully seal the free space between blast tube and the refractory lining with ceramic fibre rope or other suitable means.

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.



Procedure to install the double gas valve unit:

- two (2) gas flanges are required; they may be threaded or flanged depending on size
- first step: install the flanges to prevent entry of foreign bodies in the gas line
- on the gas pipe, clean the already assembled parts and then install the valve unit
- check gas flow direction: it must follow the arrow on the valve body
- VGD20: make sure the O-rings are correctly positioned between the flanges and the valve
- VGD40 and MBE: make sure the gaskets are correctly positioned between the flange
- fasten all the components with screws, according to the following diagrams
- make sure bolts on the flanges are properly tightened



WARNING: before executing the connections to the gas pipe network, be sure that the manual cutoff valves are closed.



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



ATTENTION: once the gas train is mounted, the gas proving test must be performed, according to the procedure set by laws in force.

To mount the gas train, proceed as follows:

- 1 In case of threaded joints: use proper seals according to the gas used- in case of flanged joints: place a gasket between the elements
- 2 Fasten all the items by means of screws, according to the diagrams showed, observing the mounting direction for each item

NOTE: the bellows unit, the manual cutoff valve and the gaskets are not part of the standard supply

Gas train with valves group MB-DLE (2 valves + gas filter + pressure governor)



Gas train with valves group VGD with built-in gas pressure governor



Gas train with valves group MB-DLE (2 valves + gas filter + pressure governor + pressure switch) + gas leakage pressure switch (PGCP)



Gas train with valves group VGD and MBE with built-in gas pressure governor + gas leakage pressure switch (PGCP)



Legend

1	Filter	6	Butterfly valve
2	Pressure switch - PGMIN	7	Pressure transducer
3	Safety valve with built in gas governor	8	Main burner
4	Proving system pressure switch - PGCP	9	Antivibration joint (*optional)
5	Pressure switch PGMAX: mandatory for MBE, optional for VGD and MB-DLE	10	Manual valve(*optional)

MultiBloc MB-DLE - Assembling the gas train



MULTIBLOC DUNGS Mounting

MB-DLE 405..412 MB-DLE 415..420

- 1 Mount flange onto tube lines: use appropriate sealing agent
- 2 Insert MB-DLE: note position of O rings
- 3 Remove MultiBloc between the threaded flanges
- 4 After installation, perform leakage and functional test
- 5 Disassembly in reverse order



MultiBloc MBE



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

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

WARNING: Slowly open the fuel cock to avoid breaking the pressure regulator.

Threaded train with MultiBloc MBE - Mounting







1. Gas pressure regulation is possible with VD-R and PS pressure sensor only.

WARNING! For US/CN installation, the output pressure must be monitoried by min. and max. pressure switches set to +/- 20% of the setpoint.

- 2. Mounting on pipe. Sensor position: 5x DN according to MBE. Pipe fitting with female thread size ¼, mount sensor with seal, observe torque.
- 3. The pressure sensor includes a vent limiter according to UL 353 and ANSI Z21.18/CSA 6.3. No venting required in locations where vent limiters are accepted by the jurisdiction.
- 4. Only PS pressure sensors specified by DUNGS are authorised to be connected to the VD-R's M12 interface.
- 5. Only PS cables specified by DUNGS are authorised to be used to connect the PS to the VD-R. Max. cable length 3 m.

Siemens VGD20.. e VGD40..

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

- 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.



Caution: the SKP2 diaphragm D must be vertical



WARNING: removing the four screws BS causes the device to be unserviceable!



Siemens VGD... con SKPx Example of gas train



version with SKP2 (built-in pressure stabilizer)



Performance range (mbar)										
	neutral	yellow	red							
Spring colour SKP 25.0	0 ÷ 22	15 ÷ 120	100 ÷ 250							
Spring colour SKP 25.4		7 ÷ 700	150 ÷ 1500							

Siemens VGD SKPx5 (Auxiliary-optional micro switch)

Siemens VGD valves with SKP actuator:

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

To replace the spring supplied with the valve group, proceed as follows:

- Remove the cap (T)
- Unscrew the adjusting screw (VR) with a screwdriver
- Replace the spring

Stick the adhesive label for spring identification on the type plate.



Gas valveGas Filter (if provided)

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



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

Once the train is installed, connect the gas valves group and pressure switches plugs.

Integrated proving system (burners equipped with LME7x, LMV, LDU)

This paragraph describes the integrated proving system operation sequence:

- At the beginning both the valves (EV1 and EV2) must be closed.
- Test space evacuating: EV2 valve (burner side) opens and keep this position for a preset time (td4), in order the bring the test space to ambient pressure.Test atmospheric pressure: EV2 closes and keep this position for a preset time (test time td1). The pressure switch PGCP has not to detect a rise of pressure.
- Test space filling: EV1 opens and keep this position for a preset time (td3), in order to fill the test space.
- Test gas pressure: EV1 closes and keep this position for a preset time (td2). The pressure switch PGCP has not to detect a pressure drop down.

If all of the test phases are passed the proving system test is successful, if not a burner lockout happens.

On LMV5x and LMV2x/3x and LME73 (except LME73.831BC), the valve proving can be parameterized to take place on startup, shutdown, or both. On LME73.831BC the valve proving is parameterized to take place on startup only.





BURNERS WITH INVERTER VARIANT (if provided)

KOSTAL		Тіро	Modello
		XXXXX	M MD. xx. xx. x. x. xxx. EI.
	I MV5	XXXXX	M MD. xx. xx. x. x. xxx. EG.
	Linto	XXXXX	MG. MD. xx. xx. x. x. xxx. EK.
1 8 - 200 as		XXXXX	MG. MD. xx. xx. x. x. xxx. ER.
	I MV2x/3x	XXXXX	M MD. xx. xx. x. x. xxx. EB.
		XXXXX	MG. MD. xx. xx. x. x. xxx. EC.

The LMV51.300 / LMV52.xxx, HAGC31-CU01 e LMV37.400/LMV26.300 electronic cam burners with fan motor driven by inverter in addition to the air and fuel adjustment curves also have a fan motor speed adjustment curve.

The LMV5x, HAGC31-CU01 equipment through a sensor controls the fan motor revolutions and with a signal in 4÷20mA controls it through the inverter. The LMV2x equipment through a sensor controls the fan motor revolutions and with a signal in 0÷10V controls it through the inverter.

Generally the curve of the inverter goes from 50% to 100% of the engine revolutions. This, in addition to improving the setting of the burner also allows a saving on the consumption of the fan engine.



Terminal interface with Inverter



BURNERS WITH INVERTER VARIANT (if provided)

		Туре	Model
		XXXXX	M MD. xx. xx. x. x. xxx. El.
	L MV5	XXXXX	M MD. xx. xx. x. x. xxx. EG.
DANFOSS	Linvo	MG. MD. xx. xx. x. x. xxx. EK.	
		XXXXX	MG. MD. xx. xx. x. x. xxx. ER.
	L M\/2x/3x	XXXXX	M MD. xx. xx. x. x. xxx. EB.
		XXXXX	MG. MD. xx. xx. x. x. xxx. EC.

The LMV51.300 / LMV52.xxx e LMV37.400/LMV26.300 electronic cam burners with fan motor driven by inverter in addition to the air and fuel adjustment curves also have a fan motor speed adjustment curve.

The LMV5x equipment through a sensor controls the fan motor revolutions and with a signal in 4÷20mA controls it through the inverter. The LMV2x equipment through a sensor controls the fan motor revolutions and with a signal in 0÷10V controls it through the inverter. Generally the curve of the inverter goes from 50% to 100% of the engine revolutions. This, in addition to improving the setting of the burner also allows a saving on the consumption of the fan engine..

Two series of interchangeable Inverters version with Inverter FC101 and FC102



Danfoss FC101

Danfoss FC102

Terminal interface with Inverter



ELECTRICAL CONNECTIONS



WARNING! Respect the basic safety rules. make sure of the connection to the earthing system. do not reverse the phase and neutral connections. fit a differential thermal magnet switch adequate for connection to the mains. WARNING! before executing the electrical connections, pay attention to turn the plant's switch to OFF and be sure that the burner's main switch is in 0 position (OFF) too. Read carefully the chapter "WARNINGS", and the "Electrical connections" section.

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

To execute the electrical connections, proceed as follows:

- 1 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 attached wiring diagrams;
- 3 check the direction of the fan motor (see next paragraph);
- 1 refit the panel cover.



WARNING: (only for double stage and progressive burners) The burner is provided with an electrical bridge between terminals 6 and 7; when connecting the high/low flame thermostat, remove this bridge before connecting the thermostat.

Rotation of electric motor

Once the electrical connection of the burner is executed, remember to check the rotation of the electric motor. The motor should rotate according to the "arrow" symbol on the body. In the event of wrong rotation, reverse the three-phase supply and check again the rotation of the motor.



CAUTION: check the motor thermal cut-out adjustment

NOTE: the burners are supplied for three-phase 380/400/415/480 V supply, and in the case of three-phase 220/230/240 V supply it is necessary to modify the electrical connections into the terminal box of the electric motor and replace the overload tripped relay.

Note on electrical supply

In the case where the power supply of the AUXILIARIES of the phase-phase burner (without a neutral), for the flame detection it is necessary to connect the RC circuit Siemens between the terminal 2 (terminal X3-04-4 in case of LMV2x, LMV3x, LMV5x, LME7x) of the base and the earth terminal, RC466890660. For LMV5 control box, please refer to the clabeling recommendations available on the circuit and the burner.

Siemens CD attached to the burner

Key

 $\label{eq:constraint} \begin{array}{l} C \mbox{ - Capacitor (22 nF , 250 V)} \\ LME \mbox{ / LMV - Siemens control box} \\ R \mbox{ - Resistor (1 M} \Omega) \\ M: \mbox{ Terminal 2 (LGB, LME), Terminal X3-04-4 (LMV2x, LMV3x, LMV5, LME7x)} \\ RC466890660 \mbox{ - RC Siemens filter} \end{array}$





DANGER! Incorrect motor rotation can seriously damage property and injure people.WARNING: before starting the burner up, be sure that the manual cutoff valves are open and check that the pressure upstream the gas train complies the value quoted on paragraph "Technical specifications". Be sure that the mains switch is closed. DANGER: During commissioning operations, do not let the burner operate with insufficient air flow (danger of formation of carbon monoxide); if this should happen, make the gas decrease slowly until the normal combustion values are achieved.WARNING: never loose the sealed screws! otherwise, the device warranty will be immediately invalidate!

LIMITATIONS OF USE

THE BURNER IS AN APPLIANCE DESIGNED AND CONSTRUCTED TO OPERATE ONLY AFTER BEING CORRECTLY 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 EXCEPT FOR ITS MAINTENANCE. TO SECURE THE MACHINE, ACT ON THE ISOLATOR SWITCH. IN CASE OF ANOMALIES THAT REQUIRED A SHUT DOWN OF THE BURNER, IT'S POSSIBLE TO ACT ON THE AUXILIARY LINE SWITCH, LOCATED ON THE BURNER FRONT PANEL.

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

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

Procedure for accessing the equipment and making electrical connections

- 1 Unscrew the screw as shown in Fig. 1
- 2 Lift the plate using the screws as shown in Fig. 2
- 3 Make the electrical connections





Gas operation

- Check that the control box is not in the lockout position; in case unlock it by pressing the relevant key (for further information on the LMV.., see the related manual).
- Check that the pressure switches/thermostats series enables the burner operation.
- Check that the gas pressure is sufficient (signalled by an error code on the AZL.. display).
- Burners fitted with gas proving system: the gas proving system test begins; when the test is performed the proving system LED turns on. At the end of the test, the burner staring cycle begins: in case of leakage in a valve, the gas proving system stops the burner and the lamp **B1** turns on.
- At the beginning of the start-up cycle, the actuator drives the air damper to the maximum opening position, then the fan motor starts up: the pre-purge phase begins. During the pre-purge phase, the air damper complete opening is signalled by the light **B2** on (see front panel).
- At the end of the pre-purge, the air damper is driven to the ignition position, the ignition transformer is energised (signalled by the light **B4** on the front panel) then, few seconds later, the EV1 and EV2 gas valves are energised (light G1 and G2 on the front panel).
- Few seconds after the gas valves opening, the ignition transformer is de-energised and light B4 turns to off.
- The burner operates in the low flame stage; few seconds later the two-stages operation begins and the burner output increases or decreases, driven by the external thermostats (progressive burners) or by the modulator (fully-modulating burners).

ADJUSTING AIR AND GAS FLOW RATES



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

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

Recommended combustion parameters							
Fuel Recommended (%) CO2 Recommended (%)							
Natural gas	9 ÷ 10	3 ÷ 4.8					
LPG	11 ÷ 12	2.8 ÷ 4.3					

Adjustments - brief description

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

- 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. "Measuring the gas pressure in the combustion head".
- Then, adjust the combustion values by setting the "gas/air" ratio" curvepoints (see the LMV related manual).
- Set, now, the low flame output (according to the procedure described on the "Siemens LMV manual") 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.

(First) Start-up preliminary operations - gas supply

Recommended actions to be carried out in sequence:

- 1 Check the burner and all its components are installed correctly
- 2 Check that all electrical and mechanical parts are connected correctly
- 3 Check that there is water or other vector fluids in the generator
- 4 Check that the ventilation gates/dampers in the plant are open and the stack is free
- 5 Connect the gauges used to adjust and check pressures on the incoming line and on the head, air and fuel side.
- 6 Open the thermostatic series and the safety chain
- 7 Turn the main switch on the panel front with the "ON/OFF" selector to position "ON".
- 8 Check the phase and neutral position is correct
- 9 Open the manual shut-off valves slowly, in order to prevent any water hammers that might seriously damage valves and pressure regulator
- 10 Check the sense of rotation of the electrical motors
- 11 Bleed the line, getting rid of all the air in the pipe as far as the main gas valve
- 12 Ensure the pressure entering the main valves is not excessive due to damage to or wrong adjustment of the line pressure regulator
- 13 Ensure the gas supply minimum pressure is at least equal to the pressure required by the pressure curves burnt gas flow



DANGER! Venting the air from the piping must take place in safe conditions, avoiding dangerous concentrations of fuel in the rooms. You must therefore ventilate the rooms and wait long enough for the gases to dissipate outside before switching on.



To ensure the proper operation of the flow sensors, the fuel/air pipes must be free of liquid residues such as oil or water. Also, make sure that the silencer is installed on the air intake.

User interface

The AZL2x.. display is shown below:

The keys functions are the following:





⊂ F

Key F

Used to adjust the "fuel" actuator position (Fuel): :

While pressing the F key, the "fuel" actuator position can be changed by means of the + and - keys.

Key A

Used to adjust the "air" actuator position (Air): While pressing the A key, the "air" actuator position can be changed by means of the + and - keys.



≗nfo

Key F + A

While pressing the two keys contemporarly, the **code** message will appear: by entering the proper password it is possible to access the **Service** mode.

Info and Enter keys

Used for Info and Service menues

Used as Enter key in the setting modes

Used as Reset key in the burner operation mode

Used to enter a lower level menu

-Key -

Used to decrease a a value Used to enter Info and Serivce during the curve adjustments

Used to enter Info and Serivce during the curve adjustments

+Key +

+



Keys (+ & -)= ESC By pressing + and - at the same time, the ESCAPE function is performed:

to enter a lower level menu

Used to increase a a value

The display will show these data:



The display will show these data:

Setting menu

The setting menu is divided into different blocks:

Bloc.	Descrizione	Description	Password	
100	Informazioni generali	General	OEM / Service / Info	
200	Controllo bruciatore	Burner control OEM / Service		
400	Curve rapporto	Ratio curves	OEM / Service	
500	Controllo rapporto	Ratio control	OEM / Service	
600	Servocomandi	Actuators	OEM / Service	
700	Storico errori	Error history	OEM / Service / Info	
900	Dati di processo	Process data	OEM / Service / Info	

The accesses to the various blocks are allowed by passwords. Passwords are divided into three levels:

- User level (info): no password needed
- Service level (Service)
- Manifacturer level (OEM)

PHASES LIST

During operation, the following program phases are shown. The meaning for each phase is quoted in the table below

Fase /	Funzione	Function
Ph00	Fase blocco	Lockout phase
Ph01	Fase di sicurezza	Safety phase
Ph10	t10 = tempo raggiungimento posizione riposo	t10 = home run
Ph12	Pausa	Standby (stationary)
Ph22	t22 = tempo di salita ventilatore (motore ventilatore = ON, valvola intercetta- zione di sicurezza = ON)	t22 = fan ramp up time (fan motor = ON, safety shutoff valve = ON)
Ph24	Verso posizione preventilazione	Traveling to the prepurge position
Ph30	t1 = tempo preventilazione	t1 = prepurge time
Ph36	Verso posizione accensione	Traveling to the ignition position
Ph38	t3 = tempo preaccensione	t3 = preignition time
Ph40	TSA1 = primo tempo sicurezza (trasformatore accensione ON)TSA1 = primo tempo sicurezza (trasformatore accensione ON)	TSA1= 1st safety time (ignition transformer ON)

1		
Ph42	ISA1 = primo tempo sicurezza (trasformatore accensione OFF)	TSA1 = 1st safety time (ignition transformer OFF)
		t42 = preignition time OFF
Ph44	t44 = intervallo 1	t44 = interval 1
Ph50	TSA2 = secondo tempo sicurezza	TSA2 = 2nd safety time
Ph52	t52 = intervallo 2	t52 = interval 2
Ph60	Funzionamento 1 (stazionario)	Operation 1 (stationary)
Ph62	t62 = massimo tempo bassa fiamma (funzionamento 2, in preparazione per spegnimento, verso bassa fiamma)	t62 = max. time low-fire (operation 2, prepa- ring for shutdown, traveling to low-fire)
Ph70	t13 = tempo postcombustione	t13 = afterburn time
Ph72	Verso posizione postcombustione	Traveling to the postpurge position
Ph74	t8 = tempo postventilazione	t8 = postpurge time
Ph80	t80 = tempo evacuazione controllo tenuta valvole	t80 = valve proving test evacuation time
Ph81	t81 = tempo perdita pressione atmosferica, prova atmosferica	t81 = leakage time test time atmospheric pressure, atmospheric test
Ph82	t82 = test perdita, test riempimento	t82 = leakage test filling test, filling
Ph83	t83 = tempo perdita pressione gas, test pressione	t83 = leakage test time gas pressure, pres sure test
Ph90	Tempo attesa "mancanza gas"	Gas shortage waiting time

Entering the Parameter levels

By means of a proper use of the keys, it is possible to enter the various level parameters, as shown in the following flow chart:



The burner and consequently the LMV2x.. are factory set; the air and fuel curves as set as well.

To enter the Info level, proceed as follows:

1 in any menu position, press keys + and - at the same time, then the program will start again: the display will show OFF.



2 until the display will show InFo, Press the enter (InFo) key



- 3 then il will show the first code (167) flashing, on the right side it will show the data entered. By pressing + or it is possible to scroll (up or down) the parameter list.
- 4 If a dot-line is shown on the right, there is no enough room for complete visualisation: press enter again the data will be completely shown for 1 to 3 seconds. By pressing enter or + and- at the same time, the system will exit the parameter visualisation and go back to the flashing number.

The Info level shows some basic parameters as:

Parameter	Description
167	Cubic meters of fule (resettable)
162	Operating hours (resettable)
163	Device operating hours
164	Burners start-ups (resettable)
166	Total number of start-ups
113	Burner number (i.e. serial number)
107	Software version
102	Software date
103	Device serial number
104	Customer code
105	Version
143	Free

5 Example: choose parameter 102 to show the date



the display shows parameter 102 flashing on the left and characters .___ on the right.

- 6 press InFo for 1-3 seconds: the date will appear
- 7 press InFo to go back to parameter "102"
- 8 by pressing + / -, it is possible to scroll up/down the parameter list (see table above), or, by pressing ESC or InFo for more seconds, the display will show
- 9 Once the last parameter is accessed (143) by pressing +, the **End** message will flash.



10 Press InFo info for more than three seconds or for more than three seconds orto return to the normal display.



If a message like the one below is shown during operation,



it means that the burner is locked out and the Errore code is shown (in the example "error code:4"); this message is alternating with another message

min s

₹

Diagnostic code (in the example "diagnostic code:3"). Record the codes and find out the fault in the Error table. To perform the reset, press InFo for one second:

P î

	Σ		ww	C	œ	ZR	p		
P Î	ľ		Ē	8	Ē	Ē	Ī.	Ð	
2	U ==								
	7	7	\bigtriangleup	V	h	min	s	%	≮

The unit displays an event which does not lead to shutdown.

The display shows current error code c: alternating with diagnostic code d:

	Þ		ww	C	œ	Zł	p		
P °∏ ∬	Ē			E	8				
	7	7	\triangle	V	h	min	s	%	¥

Press **InFo** to return to the display of phases. Example: Error code **111** / diagnostic code 0

	Þ		ww	C	œ	\square	p		
P °ĩ √				8	8	0.	0	8	2
	7	7	\bigtriangleup	V	h	min	s	%	≮

To reset, press InFo for a second. Record the codes and check the Error List to find the type of faults.

Service level

To enter the Service mode, press InFo until the display will show:



The service level shows all the information about flame intensity, actuators position, number and lock codes:

Parameter	Description
954	Flame intensity
121	% output, if set = automatic operation
922	Actuators position, 00=combustibile; 01= aria
161	Lock-outs number
701725	Lock-outs History (see chapter 23 in the LMV2x manual)



- 1 .the first parameter will be "954": the percentage of flame is shown on the right. By pressinf + or it is possible to scroll up/down the parameter list.
- 2 Once the last parameter is accessed (143) by pressing + , the End message will blink.



3 PressPress InFo info for more than three seconds or for more than three seconds orto return to the normal display.

	Σ	~~~~	С	œ	Zł	p		Þ
Ρ				ā	ī	Ē		5
ñ	۱Ħ	H	H	Н	Н	H	H	闘
Z			_	-			_	-
	∇	\triangle	V	h	min	s	%	X

For further nformation, see tha LMV2 related manual.

Adjusting the gas valves group

Multibloc MB-DLE

The multibloc unit is a compact unit consisting of two valves, gas pressure switch, pressure stabilizer and gas filter.

The valve is adjusted by means of the RP regulator after slackening the locking screw VB by a number of turns. By unscrewing the regulator RP the valve opens, screwing the valve closes. To set the fast opening remove cover T, reverse it upside down and use it as a tool to rotate screw VR. Clockwise rotation reduces start flow rate, anticlockwise rotation increases it.

Do not use a screwdriver on the screw VR!

The pressure stabilizer is adjusted by operating the screw VS located under the cover C. By screwing down the pressure is increased and by unscrewing it is reduced.

Note: the screw VSB must be removed only in case of replacemente of the coil.





Key

- 1 Electrical connection for valves
- 2 Operation display (optional)
- 3 Pressure governor closing tap
- 4 Start setting cap
- 5 Hydraulic brake and rate regulator
- 6 Coil
- 7 Test point connection G 1/8
- 8 Test point connection G 1/8 downstream of valve 1, on both sides 18 Pressure switch electric connection

- Output flange 9
- 10 Test point connection M4 downstream of valve 2
- 11 Gas flow direction
- 12 Test connection G 1/8 downstream of valve 1, on both sides
- 13 Vent nozzle pressure regulator
- 14 Filter (below cover)
- 15 Input flange
- 17 Pressure switch

Gas valveversion with SKP2 (built-in pressure stabilizer)

To increase or decrease gas pressure, and therefore gas flow rate, remove the cap T and use a screwdriver to adjust the regulating screw VR. Turn clockwise to increase the flow rate, counterclockwise to reduce it.


MultiBloc MBE Regulation VD-R whith PS



Fig. 7

ATTENTION: To set the outlet pressure of the VD-R regulator, act on the adjustment ring nut (Fig. 10) The position of the indicator in the dial indicates the value of the outlet pressure calculated as a percentage of the full scale of the PS sensor (Fig. 11)

Outlet pressure	MIN	10%	25%	50%	75%	MAX
PS-10/40	4 mbar	10 mbar	25 mbar	50 mbar	75 mbar	100 mbar
	0,4 kPa	1,0 kPa	2,5 kPa	5,0 kPa	7,5 kPa	10,0 kPa
	2 "w.c.	4 "w.c.	10 "w.c.	20 "w.c.	30 "w.c.	40 "w.c.
PS-50/200	20 mbar	50 mbar	125 mbar	250 mbar	375 mbar	500 mbar
	2,0 kPa	5,0 kPa	12,5 kPa	25,0 kPa	37,5 kPa	50,0 kPa
	8 "w.c.	20 "w.c.	50 "w.c.	100 "w.c.	150 "w.c.	200 "w.c.



Adjusting output pressure for positive pressure systems (requires PS-10/40 or PS-50/200):

Pressure taps MultiBloc MBE



Head adjusting

The combustion head position affects the flame stability. The diffuser position must be set during the commissioning according to the regulation needs. The diffuser position is factory set as shown in figure "A" (x = 10 mm). If different settings are required, it is possible to change the position: loosen the VB screw and slightly move the combustion head backwards, turning clockwise the knob VRT. Fasten VB screw when the adjustment is accomplished.







"all-ahead" position

"all-backwards" head position

Depending on the boiler application, it is possible to act on the holes (figure B) to improve the flame stability and NOx, CO emission values. If necessary, close/open the holes in figure "B" using the screws kit given with the burner.



Calibration air and gas pressure switches

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

The **gas pressure switches** check the pressure to avoid the burner operate when the pressure value is not in the requested pressure range.

Calibration the maximum gas pressure switch (when provided)

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

- remove the pressure switch plastic cover;
- 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%.
- 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%;
- replace the plastic cover.

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.

Calibration the maximum gas pressure switch (when provided)

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

- remove the pressure switch plastic cover;
- 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%.
- 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%;
- replace the plastic cover.

Calibration gas leakage pressure switch (PGCP)

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



PART IV: MAINTENANCE

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



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

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

ROUTINE MAINTENANCE

- Check that the gas meter is not moving when the burner is off. In case it is rotating, look for possible leaks.
- Check the cleaning condition of the vent. Clean the vent by using exclusively a dry brush. If needed, disassemble it from the motor's shaft and wash it by using non corrosive detergents. Prior to disassemble the vent, take the measurements in relation to the motor's shaft, so as to reassemble it in the same position.
- Check that all parts in contact with combustive air (air box, protection mesh and Archimedean screw) are clean and free from any
 obstruction that might impede free afflux. Clean it with compressed air if available and/or a dry brush or cloths. Eventually wash it
 with non corrosive detergents.
- Check the blast tube; it must be substituted in case of obvious cracks or anomalous holes. Slight deformations that do not affect combustion may be tolerated
- Check the condition of the burner-boiler gasket. Eventually substitute it.
- Check the fan's motor: no specific maintenance is needed. In case of anomalous noises when running, check the condition of the bearings and eventually substitute them or completely substitute the motor.
- Clean and examine the gas filter cartridge and replace it if necessary;
- Remove and clean the combustion head;
- Examine and clean the ignition electrodes, adjust and replace them if necessary;
- Examine and clean the detection electrode/photoelement (according to the burner models), replace it if necessary, in case of doubt, check the detection circuit, after the burner start-up;
- Clean and grease leverages and rotating parts.
- At least every 2 months, or more often if needed, clean the room where the burner is installed.
- Avoid leaving installations, papers, nylon bags, etc., inside the room. They could be sucked by the burner and cause malfunctioning.
- Check that the room's vents are free from obstructions.



ATTENTIONwhen 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.

Adjusting the gas valves group and removing the filter







Prese di pressione



- Check the filter at least once a year!
- Change the filter if the pressure difference between pressure connection 1 and 3 (Fig. 1-Fig. 3) is $\Delta p > 10$ mbar.
- Change the filter if the pressure difference between pressure connection 1 and 3 (Fig. 1-Fig. 3) is twice as high compared to the last check.
- You can change the filter without removing the fitting.
- 1 Interrupt the gas supply closing the on-off valve.
- 2 Remove screws 1 ÷ 4 using the Allen key n. 3 and remove filter cover 5 in Fig. 5.
- 3 Remove the filter 6 and replace with a new one.
- 4 Replace filter cover 5 and tighten screws 1 ÷ 4 without using any force and fasten.
- 5 Perform leakage and functional test, p_{max.} = 360 mbar.

MultiBloc MBEMultiBloc VD Mounting











1. Position VD on VB, fig. 2+3.

- 2. Slide VD forward up to the stop, fig. 4.
- 3. Screw VD on with 2 M5 screws for each, max. 5 Nm/44 in.-lb., fig. 5/6.
- 4. VD can be mounted rotated by 180°, fig. 7.

Gas filter maintenance

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).





WARNING: 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.

Removing the combustion head

- Remove the lid C.
- Unscrew the screws V holding in position the manifold G and pull out the complete group as shown in figure.

Note: for the subsequent assembly carry out the above described operations in the reverse order, checking the correct position of the OR ring.

To remove the combustion head, pull it out. Once removed, check that the air and gas holes are not obstructed. Clean the combustion head by means of compressed air or scrape off the scale using a metallic brush



Adjusting the electrodes

Important Note: Check the ignition and detection electrodes after removing/adjusting the combustion head.



ATTENTION: avoid the ignition and detection electrodes to contact metallic parts (blast tube, head, etc.), otherwise the boiler operation would be compromised. Check the electrodes position after any intervention on the combustion head.

Electrodes position settings



Replacing the electrodes



ATTENTION: avoid the ignition and detection electrodes to contact metallic parts (blast tube, head, etc.), otherwise the boiler's operation would be compromised. Check the electrodes position after any intervention on the combustion head.

To replace the ignition electrodes, proceed as follows:

- 1 remove the burner cover
- 2 disconnect the electrodes cables;
- 3 loose the screw VB that fasten the electrodes group to the combustion head;
- 4 remove the electrodes and replace them paying attention to the measures showed in previous paragraph.

Reassemble the burner by fllowing the procedure in the reversed order.



Checking the detection current with electrode (natural gas)

To check the detection signal follow the scheme in the picture below. If the signal is less than the value indicated, check the position of the detection electrode or detector, the electrical contacts and, if necessary, replace the electrode or the detector.

Device	Flame detector	Minimum detection signal
Siemens LMV2x/3x	Ionization probe	3 μA (values on display: 30%)



Checking the detection current with photocell (LME) (L.P.G.)

To check the detection signal follow the scheme in the picture below. If the signal is less than the value indicated, check the position of the detection electrode or detector, the electrical contacts and, if necessary, replace the electrode or the detector.

Device	Flame detector	Minimum detection signal
Siemens LMV2x/3x	QRA	70 μA (intensity of flame >24%)



Burner service term

- In optimal operating conditions, and with preventive maintenance, the burner can last up to 20 years.
- Upon expiry of the burner service term, it is necessary to carry out a technical diagnosis and, if necessary, an overall repair.
- The burner status is considered to be at its limit if it is technically impossible to continue using it due to non-compliance with safety requirements or a decrease in performance.
- The owner makes the decision whether to finish using the burner, or replacing and disposing of it based on the actual state of the appliance and any repair costs.
- The use of the burner for other purposes after the expiry of the terms of use is strictly prohibited.

Seasonal stop

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

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

Burner disposal

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

WIRING DIAGRAMS

Refer to the attached wiring diagrams.

WARNING

- 1 Electrical supply 230V / 400V 50Hz 3N a.c.
- 2 Do not reverse phase with neutral
- 3 Ensure burner is properly earthed

TROUBLESHOOTNG GUIDE - Gas operation

-	* No alastria nawar aunnhu	* Wait uptil power supply is back
	* Main switch open	* Close the switch
	* Thermostats open	* Check set points and thermostat connections
	* Bad thermostat set point or broken thermostat	* Set or replace the thermostat
	* No gas pressure	* Restore gas pressure
BURNER DOESN'T LIGHT	* Safety devices (manually operated safety thermostat or pressure switch and so on) open	* Restore safety devices; wait that boiler reaches its temperature then check safety device functionality.
	* Broken fuses	* Replace fuses. Check current absorption
	* Fan thermal contacts open (only three phases)	* Reset contacts and check current absorption
	* Burner control locked out	* Reset and check its functionality
	* Burner control damaged	* Benjace humer control
	* Gas flow too low	
		* Check butterfly valve opening when burner is starting (only Hi-Low flame and progressive)
GAS LEAKAGE: BURNER LOCKS OUT	* Ignition electrodes discharge to ground because dirty or broken	* Clean or replace electrodes
(NO FLAME)	* Bad electrodes setting	 Check electrodes position referring to instruction manual
	* Electrical ignition cables damaged	* Replace cables
	* Bad position of cables in the ignition transformer or into the electrodes	* Improve the installation
	* Ignition transformer damaged	* Replace the transformer
	* Bad flame detector set	
	* Flame detector damaged	* Replace or adjust flame detector
	* Bad cables of flame detector	* Check cables
	* Burner control damaged	* Benlace humer control
	* Phase and poutral inverted	* Adjust connections
BURNER LOCKS OUT WITH FLAME PRESENCE	* Once and missing on demonstration	* Objections
	* Voltage on peutral	* Check ground continuity
	* Too amall flame (due to not much goo)	* Take off tension on neutral
		* Adjust gas flow * Check gas filter cleanness
	* Too much combustion air	* Adjust air flow rate
BURNER CONTINUES TO PERFORM PRE-PURGE	* Burner control damaged	* Replace burner control
	* Air servomotor damaged	* Replace servomotor
	6	
BURNER CONTINUES TO PERFORM ALL ITS FEA-	* Air pressure switch damaged or bad links	* Check air pressure switch functions and links
BURNER CONTINUES TO PERFORM ALL ITS FEA- TURES WITHOUT IGNITING THE BURNER	* Air pressure switch damaged or bad links * Burner control damaged	* Check air pressure switch functions and links * Replace burner control
BURNER CONTINUES TO PERFORM ALL ITS FEA- TURES WITHOUT IGNITING THE BURNER	* Air pressure switch damaged or bad links * Burner control damaged * Gas valves don't open	* Check air pressure switch functions and links * Replace burner control * Check voltage on valves; if necessary replace valve or the burner control * Check if the gas pressure is so high that the valve cannot open
BURNER CONTINUES TO PERFORM ALL ITS FEA- TURES WITHOUT IGNITING THE BURNER	* Air pressure switch damaged or bad links * Burner control damaged * Gas valves don't open * Gas valves completely closed	* Check air pressure switch functions and links * Replace burner control * Check voltage on valves; if necessary replace valve or the burner control * Check if the gas pressure is so high that the valve cannot open * Open valves
BURNER CONTINUES TO PERFORM ALL ITS FEA- TURES WITHOUT IGNITING THE BURNER BURNER LOCKS OUT WITHOUT ANY GAS FLOW	* Air pressure switch damaged or bad links * Burner control damaged * Gas valves don't open * Gas valves completely closed * Pressure governor too closed	* Check air pressure switch functions and links * Replace burner control * Check voltage on valves; if necessary replace valve or the burner control * Check if the gas pressure is so high that the valve cannot open * Open valves * Adjust the pressure governor
BURNER CONTINUES TO PERFORM ALL ITS FEA- TURES WITHOUT IGNITING THE BURNER BURNER LOCKS OUT WITHOUT ANY GAS FLOW	* Air pressure switch damaged or bad links * Burner control damaged * Gas valves don't open * Gas valves completely closed * Pressure governor too closed * Butterfly valve too closed	* Check air pressure switch functions and links * Replace burner control * Check voltage on valves; if necessary replace valve or the burner control * Check if the gas pressure is so high that the valve cannot open * Open valves * Adjust the pressure governor * Open the butterfly valve
BURNER CONTINUES TO PERFORM ALL ITS FEA- TURES WITHOUT IGNITING THE BURNER BURNER LOCKS OUT WITHOUT ANY GAS FLOW	* Air pressure switch damaged or bad links * Burner control damaged * Gas valves don't open * Gas valves completely closed * Pressure governor too closed * Butterfly valve too closed * Maximum pressure switch (if installed) open	* Check air pressure switch functions and links * Replace burner control * Check voltage on valves; if necessary replace valve or the burner control * Check if the gas pressure is so high that the valve cannot open * Open valves * Adjust the pressure governor * Open the butterfly valve * Check connection and functionality
BURNER CONTINUES TO PERFORM ALL ITS FEA- TURES WITHOUT IGNITING THE BURNER BURNER LOCKS OUT WITHOUT ANY GAS FLOW	Air pressure switch damaged or bad links Air pressure switch damaged Gas valves don't open Gas valves completely closed Pressure governor too closed Butterfly valve too closed Maximum pressure switch (if installed) open. Air pressure switch doesn't close the NO contact	* Check air pressure switch functions and links * Replace burner control * Check voltage on valves; if necessary replace valve or the burner control * Check if the gas pressure is so high that the valve cannot open * Open valves * Adjust the pressure governor * Open the butterfly valve * Check connection and functionality * Check connections
BURNER CONTINUES TO PERFORM ALL ITS FEA- TURES WITHOUT IGNITING THE BURNER BURNER LOCKS OUT WITHOUT ANY GAS FLOW	Air pressure switch damaged or bad links Air pressure switch damaged Gas valves don't open Gas valves completely closed Pressure governor too closed Butterfly valve too closed Maximum pressure switch (if installed) open. Air pressure switch doesn't close the NO contact	* Check air pressure switch functions and links * Replace burner control * Check voltage on valves; if necessary replace valve or the burner control * Check if the gas pressure is so high that the valve cannot open * Open valves * Adjust the pressure governor * Open the butterfly valve * Check connection and functionality * Check pressure switch functionality
BURNER CONTINUES TO PERFORM ALL ITS FEA- TURES WITHOUT IGNITING THE BURNER BURNER LOCKS OUT WITHOUT ANY GAS FLOW	Air pressure switch damaged or bad links Burner control damaged Gas valves don't open Gas valves completely closed Pressure governor too closed Butterfly valve too closed Maximum pressure switch (if installed) open. Air pressure switch doesn't close the NO contact Air pressure switch damaged (it keeps the stand-by position or badly set	* Check air pressure switch functions and links * Replace burner control * Check voltage on valves; if necessary replace valve or the burner control * Check if the gas pressure is so high that the valve cannot open * Open valves * Adjust the pressure governor * Open the butterfly valve * Check connection and functionality * Check connections * Check air pressure switch functionality * Check air pressure switch functionality * Reset air pressure switch
BURNER CONTINUES TO PERFORM ALL ITS FEA- TURES WITHOUT IGNITING THE BURNER BURNER LOCKS OUT WITHOUT ANY GAS FLOW	Air pressure switch damaged or bad links Air pressure switch damaged Air pressure governor too closed Butterfly valve too closed Maximum pressure switch (if installed) open. Air pressure switch doesn't close the NO contact Air pressure switch damaged (it keeps the stand-by position or badly set Air pressure switch connections wrong	* Check air pressure switch functions and links * Replace burner control * Check voltage on valves; if necessary replace valve or the burner control * Check if the gas pressure is so high that the valve cannot open * Open valves * Adjust the pressure governor * Open the butterfly valve * Check connection and functionality * Check pressure switch functionality * Check air pressure switch functionality * Check air pressure switch * Check connections
BURNER CONTINUES TO PERFORM ALL ITS FEA- TURES WITHOUT IGNITING THE BURNER BURNER LOCKS OUT WITHOUT ANY GAS FLOW BURNER LOCKS OUT AND THE CONTROL WIN- DOW SHOWS A P	Air pressure switch damaged or bad links Air pressure switch damaged Air pressure governor too closed Maximum pressure switch (if installed) open. Air pressure switch doesn't close the NO contact Air pressure switch damaged (it keeps the stand-by position or badly set Air pressure switch connections wrong Air fan damaged	* Check air pressure switch functions and links * Replace burner control * Check voltage on valves; if necessary replace valve or the burner control * Check if the gas pressure is so high that the valve cannot open * Open valves * Adjust the pressure governor * Open the butterfly valve * Check connection and functionality * Check connections * Check air pressure switch functionality * Check air pressure switch functionality * Check connections * Replace motor
BURNER CONTINUES TO PERFORM ALL ITS FEA- TURES WITHOUT IGNITING THE BURNER BURNER LOCKS OUT WITHOUT ANY GAS FLOW BURNER LOCKS OUT AND THE CONTROL WIN- DOW SHOWS A P	Air pressure switch damaged or bad links Burner control damaged Gas valves don't open Gas valves completely closed Pressure governor too closed Butterfly valve too closed Maximum pressure switch (if installed) open. Air pressure switch doesn't close the NO contact Air pressure switch damaged (it keeps the stand-by position or badly set Air pressure switch connections wrong Air fan damaged No power supply	* Check air pressure switch functions and links * Replace burner control * Check voltage on valves; if necessary replace valve or the burner control * Check if the gas pressure is so high that the valve cannot open * Open valves * Adjust the pressure governor * Open the butterfly valve * Check connection and functionality * Check connections * Check air pressure switch functionality * Check air pressure switch functionality * Check connections * Replace motor * Reset power supply
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BURNER CONTINUES TO PERFORM ALL ITS FEA- TURES WITHOUT IGNITING THE BURNER BURNER LOCKS OUT WITHOUT ANY GAS FLOW BURNER LOCKS OUT AND THE CONTROL WIN- DOW SHOWS A P	Air pressure switch damaged or bad links Burner control damaged Gas valves don't open Gas valves completely closed Pressure governor too closed Butterfly valve too closed Maximum pressure switch (if installed) open. Air pressure switch doesn't close the NO contact Air pressure switch damaged (it keeps the stand-by position or badly set Air pressure switch connections wrong Air fan damaged No power supply Air damper too closed Flame detector circuit interrupted	* Check air pressure switch functions and links * Replace burner control * Check voltage on valves; if necessary replace valve or the burner control * Check if the gas pressure is so high that the valve cannot open * Open valves * Adjust the pressure governor * Open the butterfly valve * Check connection and functionality * Check connections * Check air pressure switch functionality * Check connections * Reset air pressure switch functionality * Check connections * Reset power supply * Adjust air damper position * Check wiring * Check wiring * Check photocell
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Note: specifications and data subject to change. Errors and omissions excepted.

AZL2x - LMV2x/3x Burner Management System



Service manual

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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 PRO-DUCT 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.

1) 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.

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

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

- When a decision is made to discontinue the use of the equipment, those parts likely to constitute sources of danger shall be made harmless.
- In case the equipment is to be sold or transferred to another user, or in case the original user should move and leave the unit behind, make sure that these instructions accompany the equipment at all times so that they can be consulted by the new owner and/or the installer.
- For all the units that have been modified or have options fitted then original accessory equipment only shall be used.
- 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 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

2) SPECIAL INSTRUCTIONS FOR BURNERS

- The burner should be installed in a suitable room, with ventilation openings complying with the requirements of the regulations in force, and sufficient for good combustion.
- Only burners designed according to the regulations in force should be used.
- This burner should be employed exclusively for the use for which it

was designed.

- Before connecting the burner, make sure that the unit rating is the same as delivery mains (electricity, gas oil, or other fuel).
- Observe caution with hot burner components. These are, usually, near to the flame and the fuel pre-heating system, they become hot during the unit operation and will remain hot for some time after the burner has stopped.

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

- a Remove the power supply by disconnecting the power cord from the mains.
- b) Disconnect the fuel supply by means of the hand-operated shut-off 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.

3) GENERAL INSTRUCTIONS DEPENDING ON FUEL USED

3a) 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.

3b) FIRING WITH GAS, LIGHT OIL OR OTHER FUELS GENERAL

- 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.

Precautions if you can smell gas

- a do not operate electric switches, the telephone, or any other item likely to generate sparks;
- b immediately open doors and windows to create an air flow to purge the room;
- c close the gas valves;
- d contact qualified personnel.
- Do not obstruct the ventilation openings of the room where gas appliances are installed, to avoid dangerous conditions such as the development of toxic or explosive mixtures.

DIRECTIVES AND STANDARDS

Gas burners

- European directives:
- Directive 2009/142/EC Gas Appliances;
- Directive 2006/95/EC on low voltage;
- Directive 2004/108/EC on electromagnetic compatibility

Harmonised standards :

-UNI EN 676 (Gas Burners;-EN 55014-1Electromagnetic compatibility - Requirements for household appliances, electric tools and similar apparatus.

-CEI EN 60335-1(Household and similar electrical appliances - Safety. Part 1: General requirements;

-EN 50165 (Electrical equipment of non-electric appliances for household and similar purposes. Safety requirements.

-EN 60335-2-102 (Household and similar electrical appliances. Safety. Particular requirements for gas, oil and solid-fuel burning appliances having electrical connections)

Light oil burners

European directives:

- Directive 2006/95/EC on low voltage;

- Directive 2004/108/EC on electromagnetic compatibility

Harmonised standards : -CEI EN 60335-1(Household and similar electrical appliances - Safety.

Part 1: General requirements; -UNI 267 Automatic forced draught burners for liquid fuels

-UNI 267 Automatic forced draught burners for liquid fuels

-EN 55014-1Electromagnetic compatibility - Requirements for household appliances, electric tools and similar apparatus.

-EN 50165 (Electrical equipment of non-electric appliances for household and similar purposes. Safety requirements.

National standards :

-UNI 7824: Monobloc nebulizer burners for liquid fuels. Characteristics and test methods

Heavy oil burners

European directives:

- Directive 2006/95/EC on low voltage;

- Directive 2004/108/EC on electromagnetic compatibility

Harmonised standards :

-CEI EN 60335-1 Household and similar electrical appliances - SafetyPart 1: General requirements;

-EN 55014-1Electromagnetic compatibility - Requirements for household appliances, electric tools and similar apparatus.

- EN 50165 Electrical equipment of non-electric appliances for household and similar purposes. Safety requirements.

National standards :

-UNI 7824: Monobloc nebulizer burners for liquid fuels. Characteristics and test methods

Gas - Light oil burners

European directives:

- Directive 2009/142/EC - Gas Appliances;

- Directive 2006/95/EC on low voltage;
- Directive 2004/108/EC on electromagnetic compatibility

Harmonised standards :

-UNI EN 676 Gas Burners

-EN 55014-1Electromagnetic compatibility - Requirements for household appliances, electric tools and similar apparatus.

-UNI 267 Automatic forced draught burners for liquid fuels

-CEI EN 60335-1(Household and similar electrical appliances - Safety. Part 1: General requirements;

- EN 50165 Electrical equipment of non-electric appliances for household and similar purposes. Safety requirements.

National standards :

-UNI 7824: Monobloc nebulizer burners for liquid fuels. Characteristics and test methods

Gas - Heavy oil burners

European directives:

- Directive 2009/142/EC Gas Appliances;
- Directive 2006/95/EC on low voltage;
- Directive 2004/108/EC on electromagnetic compatibility
- Harmonised standards :

-EN 55014-1Electromagnetic compatibility - Requirements for household appliances, electric tools and similar apparatus.

-UNI EN 676 (Gas Burners;

-CEI EN 60335-1(Household and similar electrical appliances - Safety. Part 1: General requirements;

- EN 50165 Electrical equipment of non-electric appliances for household and similar purposes. Safety requirements.

National standards :

-UNI 7824: Monobloc nebulizer burners for liquid fuels. Characteristics and test methods

Industrial burners

European directives:

- Directive 2009/142/EC - Gas Appliances;

- Directive 2006/95/EC on low voltage;

- Directive 2004/108/EC on electromagnetic compatibility

Harmonised standards :

-EN 55014-1Electromagnetic compatibility - Requirements for household appliances, electric tools and similar apparatus.

-EN 50165 Electrical equipment of non-electric appliances for household and similar purposes. Safety requirements.

-UNI EN 746-2: Industrial thermoprocessing equipment

Burner data plate

Model For the following information, please refer to Year the data plate: S.Number

- burner type and burner model: must be reported in any communication with the Fuel supplier
- burner ID (serial number): must be reported in any communication with the supplier

•	date of	production	(year and	month)
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WARNING!

DANGER!

WARNING!

Protection information about fuel type and network • Drwaing n° pressure P.I.N.

SYMBOLS USED



Failure to observe the warning may result in irreparable damage to the unit or damage to the environment

Туре

Output

. Oil Flow

Category Gas Press

Viscosity EI.Supply EI.Consump.

Fan Motor



Failure to observe the warning may result in serious injuries or death.



Failure to observe the warning may result in electric shock with lethal consequences

MICROPROCESSOR CONTROLLED SYSTEM

The control system is made of the Siemens LMV central unit that performs all the burner control functions and of the Siemens AZL local programming unit that interfaces the system with the user.



Keys

- 1 Burner
- 2 AZL2..
- 3 Air actuator
- 4 Fuel actuator
- 5 LMV2..

User interface

The AZL2x.. display/programming unit is shown below:



The keys functions are the following:

Key F

Used to adjust the "fuel" actuator position (Fuel): :

While pressing the **F** key, the "fuel" actuator position can be changed by means of the **+** and **-** keys.

Key A

Used to adjust the "air" actuator position (Air): While pressing the A key, the "air" actuator position can be changed by means of the + and - keys.

Key F + A

While pressing the two keys contemporarly, the code message will appear: by entering the proper password it is possible to access the Service mode.

Info and Enter keys

Used for Info and Service menues Used as Enter key in the setting modes Used as Reset key in the burner operation mode Used to enter a lower level menu -Key -Used to decrease a a value Used to enter Info and Serivce during the curve adjustments +Key + Used to increase a a value

Used to enter Info and Serivce during the curve adjustments

Keys (+ & -)= ESC

By pressing + and - at the same time, the ESCAPE function is perfomed:

to enter a lower level menu

The display will show these data:

Lock+unlock codes

Flame

Open valves

Ignition transformers energised

Fan motor energised

Oil pre-heater energised

Plant heat request

Parametere setting mode

Info mode

Service mode

- Closing actuator
- Opening actuator

IUnit measure





nfo









Parameters level (heating engineer)



Setting menu

The seeting menu is divided into different blocks:

Bloc.	Descrizione	Description	Password
000		Internal parameters	OEM / Service
100	Informazioni generali	General	OEM / Service / Info
200	Controllo bruciatore	Burner control	OEM / Service
300	Controllo bruciatore (solo LMV26)	Burner control (LMV26 only)	OEM / Service
400	Curve rapporto	Ratio curves	OEM / Service
500	Controllo rapporto	Ratio control	OEM / Service
600	Servocomandi	Actuators	OEM / Service
700	Storico errori	Error history	OEM / Service / Info
900	Dati di processo	Process data	OEM / Service / Info

The access to the various blocks is allowed by passwords. Passwords are divided into three levels:

- User level (info): no password needed
- Service level (Service)
- Manifacturer level (OEM)

Block 000: Internal Parameter

Param.	Descrizione	Description	Password
041	Password livello assistenza (ingegnere del calore)	Password heating engineer (4 characters)	OEM
042	Password livello OEM (costruttore del brucia- tore)	Password OEM (5 characters)	OEM
050	Start backup/restore via AZL2x/PC	Start backup / restore via AZL2/ PC sof- tware (set parameter to 1) Index 0: Create backup Index 1: Execute restore Error dia- gnostics via negative values (see error code 137)	SO
055	Identificazione bruciatore (backup dati)	Burner identification of AZL2 backup data set	SO
056		ASN extraction of AZL2 backup data set	SO
057	Versione software creata dal set dati backup	Software version when creating the AZL2 backup data set	Service / Info

Block 100: General information

Param.	Descrizione	Description	Password	LMV20 LMV27	LMV26	LMV37
102	Data produzione (in gg-mm-aa)	Identification date (yy-mm-dd)	Service / Info	х	х	х
103	Numero identificativ	Identification number	Service / Info	х	х	х
104	Set di parametri preimpostati: codice cliente	Preselected parameter set: customer code	Service / Info	х	х	х
105	Set di parametri preimpostati: versione	Preselected parameter set: version	Service / Info	х	х	х
107	Versione softwar	Software version	Service / Info	х	х	х
108	Variante software	Software variant	Service / Info	х	х	х
113	Identificativo bruciatore	Burner identification	Service / Info SO password for writing	x	x	x
121	Potenza manuale Valore "Undefined = automatico Impostare un valore inferiore a = in modo che il display mostri altrimenti, il controllore rimarrà sempre in stand-by e il display mostrerà la scritta OFF lampeggiante.	Manual output Undefined = automatic mode	Service / Info	x	x	x

	Frequenza di rete	Mains frequency				
125	0 = 50 Hz	0 = 50 Hz	Service / Info	х	х	х
	1 = 60 Hz	1 = 60 Hz				
126	Luminosità display	Display brightness	Service / Info	х	х	х
127	Tempo dopo il quale, se non viene premuto nessun tast il software esce dalla modalita programmazione (valore fabbrica = 60min - range impostazione: 10 - 120 min)	Timeout for menu operation (default value = 60min - range: 10 - 120 min)	OEM	x	x	x
130	Azzeramento Storico errori Impostare prima il parametro a 1 e poi a 2; se compare "0" = lo Storico è stato azzerato se compare "-1" = scaduto tempo sequ. 1_2	Delete display of error history To delete display : set to 1 then to 2; return value "0" = error history deleted return value "-1" = timeout of 1_2 sequence	OEM / Service	x	x	x
141	Attivazione comunicazione bus 0 = off 1 = Modbus 2 = riserva	Operating mode BACS 0 = off 1 = Modbus 2 = reserved	OEM / Service		x	х
142	Tempo d'arresto in caso di guasto di comuni- cazione	Setback time in the event of communication breakdown	OEM / Service		x	x
143	Riserva	Reserved	Service / Info		х	х
144	Riserva	Reserved	OEM / Service		х	х
145	Indirizzo dispositivo per Modbus	Device address for Modbus	OEM / Service		х	х
146	Velocità di trasmissione per Modbus	Baud rate for Modbus	OEM / Service		х	х
147	Parità per Modbus	Parity for Modbus	OEM / Service		х	х
148	on una interruzione della comunicazione bus: 0 19.9 = bruciatore spento 20 100 = 20 100% potenza Per il funzionamento multistadio: 0 = bruciatore OFF, P1, P2, P3 non valido = nessun standard di prestazione della LMV.	Performance standard at interruption of com- munication with building automation For modulation operation the setting range is as fol-lows: 019.9 = burner off 20100 = 20100% burner rating For multistage ope- ration apply to setting range: 0 = burner OFF, P1, P2, P3 Invalid = no performance stan- dards of the building auto-mation	OEM / Service		x	x
161	Numero di avarie	Number of faults	Service / Info	х	x	х
162	Ore di esercizio (azzerabile da Service)	Operating hours (resettable by Service)	Service / Info	х	х	х
163	Ore di esercizio (con dispositivo sotto ten- sione)	Operating hours (when unit is live)	Service / Info	x	x	x
164	Numero di partenze (azzerabile da Service)	Number of startups (resettable by Service)	Service / Info	х	х	х
165	Numero di partenze	Number of startups	Service / Info	х	х	х

166	Numero totale di partenze (non azzerabile)	Total number of startups	Service / Info	х	х	х
167	Volume combustibile (azzerabile da OEM)	Fuel volume (resettable by OEM)	Service / Info	х	х	х
172	Fuel 1(secondo combustibile)Ore di eserci- zio (azzerabile da Service)	Fuel 1: Operation hours resettable	Service / Info		x	
174	Fuel 1 (secondo combustibile) Numero di partenze (azzerabile da Service)	Fuel 1: Number of startups resettable	Service / Info		x	
175	Fuel 1 (secondo combustibile) Numero di partenze	Fuel 1: Number of startups	Service / Info		x	
177	Fuel 1 (secondo combustibile) Volume com- bustibile (azzerabile da OEM)	Fuel 1: Fuel volume resettable (m³, l, ft³, gal)	Service / Info		x	

Block 200: Burner control

Param.	Descrizione	Description	Password	LMV20 LMV27	LMV26	LMV37
201	Modalità funzionamento bruciatore (rampa combustibile, modulante / multistadio, servo- comandi, ecc.) = non definito (cancellazione curve) 1 = accensione diretta a gas (G mod) 2 = accensione tramite pilota gas con attacco tra le due elettrovalvole EV1/EV2 del gas (Gp1 mod) 3 = accensione tramite pilota gas con attacco a monte dell'elettrovalvola EV1 del gas (Gp2 mod) 4 = accensione a gasolio - modulante (Lo mod) 5 = accensione a gasolio - bistadio (Lo 2 stage) 6 = accensione a gasolio - tristadio (Lo 3 stage) 7 = accensione diretta a gas - regolazione pneumatica (G mod pneu) 8 = accensione tramite pilota gas con attacco tra le due elettrovalvole EV1/EV2 del gas - regolazione pneumatica (Gp1 mod pneu) 9 = accensione tramite pilota gas con attacco a monte dell'elettrovalvola EV1 del gas - regolazione pneumatica (Gp2 mod pneu)	 Burner operating mode (fuel train, modulating / multistage, actuators, etc) = undefined (delete curves) 1 = gas direct ignition (G mod) 2 = ignition by gas pilot connected between the two gas solenoid valves EV1/EV2 (Gp1 mod) 3 = ignition by gas pilot connected upstream the gas EV1 (Gp2 mod) 4 = light oil ignition - modulating (Lo mod) 5 = light oil ignition - double stage (Lo 2 stage) 6 = light oil ignition - three stage (Lo 3 stage) 7 = gas direct ignition - pneumatic regulation (G mod pneu) 8 = ignition by gas pilot connected between the two gas solenoid valves EV1/EV2 - pneumatic regulation (Gp1 mod pneu) 9 = ignition by gas pilot connected upstream the gas EV1 - pneumatic regulation (Gp2 mod pneu) 	OEM / Service	x	x	x
	 10 = olio modulante con accensione tramite pilota (LOGp mod) 11 = olio 2 stadi con accensione tramite pilota (LOGp 2-stage) 12 = olio modulante con 2 valvole combustibile (LOmod 2 valvole) 13 = olio modulante con 2 valvole combustibile e con accensione tramite pilota (LOGp 2 valvole) 14 = gas modulante pneumatico senza servomotori (Gmod pneu) 	 10 = LoGp mod 11 = LoGp 2-stage 12 = Lo mod 2 fuel valves 13 = LoGp mod 2 fuel valves 14 = G mod pneu without actuator 				

	 15 = gas rampa Gp1 modulante pneumatico senza servomotori (Gp1 mod pneu) 16 = gas rampa Gp2 modulante pneumatico senza servomotori (Gp2 mod pneu) 17 = olio LO 2 stadi senza servomotori 18 = olio LO 3 stadi senza servomotori 19 = gas Gmod con solo servomotore gas 20 = gas Gp1 mod con solo servomotore gas 21 = gas Gp2 mod con solo servomotore gas 22 = olio LO mod con solo servomotore olio 	 15 = Gp1 mod pneu without actuator 16 = Gp2 mod pneu without actuator 17 = Lo 2-stage without actuator 18 = Lo 3-stage without actuator 19 = G mod gas actuator only 20 = Gp1 mod gas actuator only 21 = Gp2 mod gas actuator only 22 = Lo mod oil actuator only 				
208	Stop programma 0 = non attivo 1 = posizione preventilazione (Ph24 - fase 24 del programma) 2 = posizione accensione (Ph36 - fase 36 del programma) 3 = intervallo di tempo 1 (Ph44 - fase 44 del programma) 4 = intervallo di tempo 2 (Ph52 - fase 52 del programma)	Program stop 0 = deactivated 1 = pre-purge position (Ph24 - program phase 24) 2 = ignition position (Ph36 - program phase 36) 3 = interval 1 (Ph44 - program phase 44) 4 = interval 2 (Ph52 - program phase 52)	OEM / Service	x	x	x
210	Allarme impedimento avviamento 0 = non attivo 1 = attivo	Alarm in the event of start prevention 0 = deactivated 1 = activated	OEM / Service	x	x	x
211	Tempo aumento giri ventilatore (valore fab- brica = 2s - range impostazione: 2 - 60 s)	Fan ramp up time (default value = 2s - range: 2 - 60 s)	OEM / Service	х	х	x
212	Tempo massimo raggiungimento bassa fiamma (valore fabbrica = 45 s - range impo- stazione: 0.2 s - 10 min) Stabilisce il massimo intervallo di tempo durante il quale il bruciatore raggiunge la minima potenza e poi si spegne	Maximum time down to low-fire (default value = 45 s - range: 0.2 s - 10 min) It states the maximum time interval during which the burner drives to the low output and then turns off	OEM / Service		x	
213	Tempo minimo raggiungimento posizione di stand by (valore fabbrica = 2 s - range impo- stazione: 2 - 60 s)	Min. time home run (default value = 2 s - range: 2 - 60 s)	OEM	x	x	x
214	Tempo massimo inizio partenza	Max. time start release	OEM	х	х	х
215	Limite ripetizioni catena di sicurezza (valore fabbrica = 16 - range impostazione:1 - 16)	Repetition limit safety loop (default value = 16 - range: 1 - 16)	OEM / Service	х	х	x
217	Tempo massimo per rilevazione segnale (valore fabbrica = 30s - range impostazione: 5s - 10 min)	Max. time to detector signal (default value = 30s - range: 5s - 10 min)	OEM	x	x	x

221	Gas: sonda rilevazione fiamma attivo (valore fabbrica = 1)	Gas: active detector flame evaluation (default value = 1) 0 = QRB/QRC 1 = ION / QRA	OEM / Service	x	x	x
222	Gas: Preventilazione (valore fabbrica = 1) 1 = attivo 0 = non attivo ATTENZIONE : In ambito civile la norma EN676 rende obbligatoria la preventilazione. In ambito industriale, vedere i casi in cui la norma EN746-2 prevede la possibilità di non fare la preventilazione. In questi ultimi casi il bruciatore deve essere costruito obbligatoriamente con controllo di tenuta e valvole gas in classe A	Gas: Pre-purging (default value = 1) 1 = active 0 = deactivated WARNING: in the civil field, the prepurge is mandatory according to the standard EN676. In the industrial fiels, check if the pre purge can be avoided according to the stanrds EN746-2 If the prepurge is not performed, the burner must be equipped with two valves and the proving system.	OEM / Service	x	x	x
223	Limite ripetizioni pressostato gas di minima pressione (valore fabbrica = 16 - range impo- stazione:1 - 16)	Repetition limit pressure switch-min-gas (default value = 16 - range:1 - 16)	OEM / Service	x	x	x
225	Gas: tempo di preventilazione (valore fab- brica = 20s - range impostazione:20s - 60min)	Gas: Prepurge time (default value = 20s - range:20s - 60min)	OEM / Service	x	x	x
226	Gas: tempo di preaccensione (valore fab- brica = 2s - range impostazione:0.2s - 60min)	Gas: Preignition time (default value = 2s - range: 0.2s - 60min)	OEM / Service	x	x	x
227	Gas: tempo di sicurezza 1 (TSA1) (valore fabbrica = 3s - range impostazione:0.2 - 10s)	Gas: Safety time 1 (TSA1) (default value = 3s - range: 0.2 - 10s)	OEM	x	x	x
229	Gas: tempo di risposta a cadute di pressione entro TSA1 e TSA2 (valore fabbrica = 1.8s - range impostazione:0.2s - 9.8s)	Gas: time to respond to pressure faults in TSA1 e TSA2 (default value = 1.8s - range: 0.2s - 9.8s)	OEM	x	x	x
230	Gas: Intervallo 1 (valore fabbrica = 2s - range impostazione:0.2s - 60min)	Gas: Interval 1 (default value = 2s - range: 0.2s - 60min)	OEM / Service	x	x	x
231	Gas: tempo di sicurezza 2 (TSA2) (valore fabbrica = 3s - range impostazione:0.2 - 10s)	Gas: Safety time 2 (TSA2) (default value = 3s - range:0.2 - 10s)	OEM	x	x	x
232	Gas: Intervallo 2 (valore fabbrica = 2s - range impostazione:0.2s - 60min)	Gas: Interval 2 (default value = 2s - range:0.2s - 60min)	OEM / Service	x	x	
233	Gas: Tempo postcombustione (valore fab- brica = 8s - range impostazione:0.2s - 60s)	Gas: postcombustion time (default value = 8s - range:0.2s - 60s)	OEM / Service	x	x	x
234	Gas: Tempo postventilazione (valore fab- brica = 0.2s - range impostazione:0.2s - 180min)	Gas: Postpurge time (default value = 0.2s - range:0.2s - 180min)	OEM / Service	x	x	x

236	Gas: Pressostato gas di minima (default = 1) 0 = inattivo 1 = pressostato gas di minima (a monte val- vola V1) 2 = controllo perditavalvole via pressostato (montato tra le valvole V1 e V2)	Gas: Pressure switch-min input 0 = inactive 1 = pressure switch-min (upstream of fuel valve 1 (V1)) 2 = valve proving via pressure switch-min (between fuel valves 1 (V1) and 2 (V2))	OEM / Service	x	x	
237	Gas: Pressostato gas di massima / ingresso- POC 0 = inattivo 1= pressostato gas di massima 2= POC 3 = pressostato controllo perdite	Gas: Pressure switch-max / POC input 0 = inactive 1 = pressure switch-max 2 = POC 3 = pressure switch valve proving			x	x
239	Gas: Forzatura al funzionamento intermit- tente 0 = disattivato 1 = attivato Attenzione : di default questo parametro è attivo = (1); esso è modificabile solo su LMV37. Dal punto di vista della sicurezza, il funzionamento continuo è valido esclusiva- mente per bruciatori di gas con elettrodo di rilevazione.	Gas: Forced intermittent operation 0 = deacti- vated 1 = activated	OEM			x
240	Limite ripetizioni perdita di fiamma (valore fabbrica = 2 - range impostazione:1 - 2)	Repetition limit loss of flame (default value= 2 - range:1 - 2)	OEM	х	x	x
241	Gas: esecuzione controllo tenuta (valore fabbrica = 2) 0 = no controllo tenuta 1 = controllo tenuta in avviamento 2 = controllo tenuta in arresto 3 = controllo tenuta in arresto e in avviamento	Gas: execution proving test (default value= 2) 0 = no proving test 1 = proving test on startup 2 = proving test on shutdown 3 = proving test on shutdown and on startup	OEM / Service	x	x	x
242	Gas: tempo evacuazione controllo tenuta (valore fabbrica = 3s - range imposta- zione:0.2s - 10s)	Gas: proving test evacuation time (default value = 3s - range:0.2s - 10s)	OEM	х	x	x

	243	Gas: tempo pressione atmosferica controllo tenuta (valore fabbrica = 10s - range impo- stazione:0.2s - 60s)	Gas: proving test time atmospheric pres- sure (default value = 10s - range:0.2s - 60s)	OEM	x	x	x
17	244	Gas: tempo riempimento controllo tenuta (valore fabbrica = 3s - range imposta- zione:0.2s - 10s)	Gas: proving test filling time (default value = 3s - range:0.2s - 10s)	OEM	x	x	x
	245	Gas: tempo test pressione gas (valore fab- brica = 10s - range impostazione:0.2s - 60s)	Gas: proving test time gas pressure (default value = 10s - range:0.2s - 60s)	OEM	x	x	x
	246	Gas: tempo attesa consenso pressostato di minima (valore fabbrica = 10s - range impo- stazione:0.2s - 60s) Se la pressione del gas è troppo bassa, in fase 22 non verrà eseguito l'avviamento: il sistema compie un numero impostabile di tentativi finché non si arriva al blocco. Il tempo di attesa tra un tentativo e il succes- sivo viene raddoppiato ad ogni tentativo.	Gas: waiting time gas shortage (default value = 10s - range:0.2s - 60s) If the gas pressure is too low, in phase 22 the startup will not be performed: the system tries for a certain number of times the it locks out. The time interval between two attempts is doubled at each attempt.	OEM	x	x	x
	248	Gas: Tempo di post-ventilazione 3 (abortito con regolatore di potenza (LR)-ON	Gas: Postpurge time 3 (abortion with load controller (LR)-ON	OEM / Service	x	x	x
	261	Olio: sonda rilevazione fiamma attivo (valore fabbrica = 0) 0 = QRB./QRC 1 = ION / QRA	Oil: active detector flame evaluation (default value = 0) 0 = QRB/QRC 1 = ION / QRA	OEM / Service	x	x	x
-	262	Olio: preventilazione (valore fabbrica = 1) 1 = attivo 0 = non attivo In ambito civile la norma EN267 rende obbli- gatoria la preventilazione. In ambito indu- striale, vedere i casi in cui la norma EN746-2 prevede la possibilità di non fare la preventila- zione.	Oil: prepurging (default value = 1) 0 = deactivated 1 = activated 0 = deactivated WARNING: in the civil field, the prepurge is mandatory according to the standard EN267. In the industrial fiels, check if the pre purge can be avoided according to the standard EN746-2	OEM / Service	x	x	x
	265	Olio: tempo preventilazione (valore fabbrica = 15s - range impostazione:15s - 60min)	Oil: prepurging time (default value = 15s - range:15s - 60min)	OEM / Service	x	x	x
	266	Olio: tempo preaccensione (valore fabbrica = 2s - range impostazione:0.2s - 60min)	Oil: preignition time (default value = 2s - range:0.2s - 60min)	OEM / Service	x	x	x
	267	Olio: tempo di sicurezza 1 (TSA1) (valore fabbrica = 5s - range impostazione:0.2 - 15s)	Oil: safety time 1 (TSA1) (default value = 5s - range:0.2 - 15s)	OEM	x	x	x
	269	Olio: tempo di risposta a cadute di pressione entro TSA1 e TSA2 (valore fabbrica = 1.8s - range impostazione:0.2s - 14.8s)	Oil: time to respond to pressure faults in TSA1 and TSA2 (default value = 1.8s - range:0.2s - 14.8s)	OEM	x	x	x

270	Olio: Intervallo 1 (valore fabbrica = 2s - range impostazione:0.2s - 60min)	Oil: Interval 1 (default value = 2s - range:0.2s - 60min)	OEM / Service	х	x	x
271	Olio: tempo di sicurezza 2 (TSA2) (valore fabbrica = 3s - range impostazione:0.2 - 10s)	Oil: safety time 2 (TSA2) (default value = 3s - range:0.2 - 10s)	OEM	х	x	x
272	Olio: Intervallo 2 (valore fabbrica = 2s - range impostazione:0.2s - 60min)	Oil: Interval 2 (default value = 2s - range:0.2s - 60min)	OEM / Service	x	x	x
273	Olio: Tempo postcombustione (valore fab- brica = 8s - range impostazione:0.2s - 60s)	Oil: Postcombustion time (default value = 8s - range:0.2s - 60s)	OEM / Service	x	x	x
274	Olio: Tempo postventilazione (valore fab- brica = 0.2s - range impostazione:0.2s - 180min)	Oil: Postpurging time (default value = 0.2s - range:0.2s - 180min)	OEM / Service	x	x	x
276	Olio : Pressostato olio di minima (default = 1) 0 = inattivo 1 = attivo dalla fase 38 2 = attivo dal tempo di sicurezza (TSA)	Oil. Pressure switch-min input 0 = inactive 1 = active from phase 38 2 = active from safety time (TSA)	OEM / Service	x	x	
277	Olio: Pressostato olio di massima / ingresso- POC 0 = inattivo 1= pressostato olio di massima 2= POC	Oil: Pressure switch-max/POC input 0 = inactive 1 = pressure switch-max 2 = POC			x	
279	Olio: Forzatura al funzionamento intermittente 0 = disattivato 1 = attivato Attenzione : di default questo parametro è attivo = (1); esso è modificabile solo su LMV37	Oil: Forced intermittent operation 0 = deacti- vated 1 = activated	OEM		x	x
280	Limite ripetizioni perdita di fiamma (valore fabbrica = 2 - range impostazione:1 - 2)	Repetition limit value loss of flame (default value = 2 - range:1 - 2)	OEM	х	x	х
281	Olio: tempo iniezione olio (valore fabbr. = 1) 0 = preaccensione corta (Ph38 - fase pro- gramma 38) 1 = preaccensione lunga (con ventilatore) (Ph22 - fase programma 22)	Oil: time oil ignition (default value = 1) 0 = short preignition (Ph38-progr. phase 38) 1 = long preignition (with fan) (Ph22 - program phase 22)	OEM / Service	x	x	x
284	Olio: Tempo di post-ventilazione 3 (abortito con regolatore di potenza (LR)-ON	Oil: Postpurge time 3 (abortion with load con- troller (LR)-ON	OEM / Service	х	x	x

Block 300: Burner control (only with LMV26)

Param.	Descrizione	Description	Password	LMV20 LMV27	LMV26	LMV37
	Combustibile 1 : Modalità funzionamento bru- ciatore (rampa combustibile, modulante / multistadio, servocomandi, ecc.)	Fuel 1 : Burner operating mode (fuel train, modulating / multistage, actuators, etc)				
	<pre>= non definito (cancellazione curve)</pre>	= undefined (delete curves)				
	1 = accensione diretta a gas (G mod)	1 = gas direct ignition (G mod)				
	2 = accensione tramite pilota gas con attacco tra le due elettrovalvole EV1/EV2 del gas (Gp1 mod)	2 = ignition by gas pilot connected between the two gas solenoid valves EV1/EV2 (Gp1 mod)				
	3 = accensione tramite pilota gas con attacco a monte dell'elettrovalvola EV1 del gas (Gp2 mod)	3 = ignition by gas pilot connected upstream the gas EV1 (Gp2 mod)				
	4 = accensione a gasolio - modulante (Lo mod)	4 = light oil ignition - modulating (Lo mod)				
301	5 = accensione a gasolio - bistadio (Lo 2 stage)	5 = light oil ignition - double stage (Lo 2 stage)	OEM / Service		x	
	6 = accensione a gasolio - tristadio (Lo 3 stage)	6 = light oil ignition - three stage (Lo 3 stage)				
	7 = accensione diretta a gas - regolazione pneumatica (G mod pneu)	7 = gas direct ignition - pneumatic regulation (G mod pneu)				
	8 = accensione tramite pilota gas con attacco tra le due elettrovalvole EV1/EV2 del gas - regolazione pneumatica (Gp1 mod pneu)	 8 = ignition by gas pilot connected between the two gas solenoid valves EV1/EV2 - pneu- matic regulation (Gp1 mod pneu) 				
	9 = accensione tramite pilota gas con attacco a monte dell'elettrovalvola EV1 del gas regolazione pneumatica (Gp2 mod pneu)	9 = ignition by gas pilot connected upstream the gas EV1 - pneumatic regulation (Gp2 mod pneu)				
	10 = olio modulante con accensione tramite pilota (LOGp mod)	10 = LoGp mod				

	11 = olio 2 stadi con accensione tramite pilota	11 = LoGp 2-stage			
	(LOGp 2-stage)	12 = Lo mod 2 fuel valves			
	12 = olio modulante con 2 valvole combusti-	13 = LoGp mod 2 fuel valves			
	12 – elie medulente con 2 velvele combusti	14 = G mod pneu without actuator			
	hile e con accensione tramite pilota (I OGn 2	15 = Gp1 mod pneu without actuator			
	valvole)	16 = Gp2 mod pneu without actuator			
	14 = gas modulante pneumatico senza servo- motori (Gmod pneu)				
	15 = gas rampa Gp1 modulante pneumatico senza servomotori (Gp1 mod pneu)				
	16 = gas rampa Gp2 modulante pneumatico				
	senza servomotori (Gp2 mod pneu)				
	17 = olio LO 2 stadi senza servomotori	17 = Lo 2-stage without actuator			
	18 = olio LO 3 stadi senza servomotori	18 = Lo 3-stage without actuator			
	19 = gas Gmod con solo servomotore gas	19 = G mod gas actuator only			
	20 = gas Gp1 mod con solo servomotore gas	20 = Gp1 mod gas actuator only		х	
	21 = gas Gp2 mod con solo servomotore gas	21 = Gp2 mod gas actuator only			
	22 = olio LO mod con solo servomotore olio	22 = Lo mod oil actuator only			
	Combustibile 1 - Gas: sonda rilevazione	Fuel 1 - Gas: active detector flame evalua-			
221	fiamma attivo (valore fabbrica = 1) -	tion (default value = 1)			
521	0 = QRB/QRC	0 = QRB/QRC	UEIM / Service	Х	
	1 = ION / QRA	1 = ION / QRA			
	Combustibile 1 - Gas: Preventilazione (valore	Fuel 1 - Gas: Pre-purging (default value = 1)			
		1 = active			
		0 = deactivated			
		WARNING: in the civil field, the prepurae is			
	ATTENZIONE : In ambito civile la norma	mandatory according to the standard EN676.			
322	EN070 rende oppligatoria la preventilazione.	In the industrial fiels, check if the pre purge	OEM / Service	Х	
	norma EN746-2 prevede la possibilità di non	can be avoided according to the stanrds			
	fare la preventilazione.	EN746-2			
	In questi ultimi casi il bruciatore deve essere	If the prepurge is not performed, the burner			
	costruito obbligatoriamente con controllo di	must be equipped with two valves and the			
	tenuta e valvole gas in classe A.	proving system.			
202	Limite ripetizioni pressostato gas di minima	Repetition limit pressure switch-min-gas	0514/0		
323	pressione (valore tabbrica = 16 - range impo-	(default value = 16 - range:1 - 16)	OEM / Service	х	
325	compustibile 1 - Gas: tempo di preventila- zione (valore fabbrica = 20s - range imposta-	ruer i - Gas: Prepurge time (default value = 20s - range:20s - 60min)	OFM / Service	¥	
	zione:20s - 60min)			~	

	326	Combustibile 1 - Gas: tempo di preaccen- sione (valore fabbrica = 2s - range imposta- zione:0.2s - 60min)	Fuel 1 - Gas: Preignition time (default value = 2s - range: 0.2s - 60min)	OEM / Service	x	
	327	Combustibile 1 - Gas: tempo di sicurezza 1 (TSA1) (valore fabbrica = 3s - range impo- stazione:0.2 - 10s)	Fuel 1 - Gas: Safety time 1 (TSA1) (default value = 3s - range: 0.2 - 10s)	OEM	x	
	329	Combustibile 1 - Gas: tempo di risposta a cadute di pressione entro TSA1 e TSA2 (valore fabbrica = 1.8s - range imposta- zione:0.2s - 9.8s)	Fuel 1 - Gas: time to respond to pressure faults in TSA1 e TSA2 (default value = 1.8s - range: 0.2s - 9.8s)	OEM	x	
	330	Combustibile 1 - Gas: Intervallo 1 (valore fabbrica = 2s - range impostazione:0.2s - 60min)	Fuel 1 - Gas: Interval 1 (default value = 2s - range: 0.2s - 60min)	OEM / Service	x	
	331	Combustibile 1 - Gas: tempo di sicurezza 2 (TSA2) (valore fabbrica = 3s - range imposta- zione:0.2 - 10s)	Fuel 1 - Gas: Safety time 2 (TSA2) (default value = 3s - range:0.2 - 10s)	OEM	x	
	332	Combustibile 1 - Gas: Intervallo 2 (valore fabbrica = 2s - range impostazione:0.2s - 60min)	Fuel 1 - Gas: Interval 2 (default value = 2s - range:0.2s - 60min)	OEM / Service	x	
2	333	Combustibile 1 - Gas: Tempo postcombu- stione (valore fabbrica = 8s - range imposta- zione:0.2s - 60s)	Fuel 1 - Gas: postcombustion time (default value = 8s - range:0.2s - 60s)	OEM / Service	x	
	334	Combustibile 1 - Gas: Tempo postventila- zione (valore fabbrica = 0.2s - range impo- stazione:0.2s - 180min)	Fuel 1 - Gas: Postpurge time (default value = 0.2s - range:0.2s - 180min)	OEM / Service	x	
	336	Combustibile 1 - Gas: Pressostato gas di minima (default = 1) 0 = inattivo 1 = pressostato gas di minima (a monte val- vola V1) 2 = controllo perditavalvole via pressostato (montato tra le valvole V1 e V2)	Fuel 1 - Gas: Pressure switch-min input 0 = inactive 1 = pressure switch-min (upstream of fuel valve 1 (V1)) 2 = valve proving via pressure switch-min (between fuel valves 1 (V1) and 2 (V2))	OEM / Service	x	
	337	Combustibile 1 - Gas: Pressostato gas di massima / ingressoPOC 0 = inattivo 1= pressostato gas di massima 2= POC 3 = pressostato controllo perdite	Fuel 1 - Gas: Pressure switch-max / POC input 0 = inactive 1 = pressure switch-max 2 = POC 3 = pressure switch valve proving		x	

	340	Limite ripetizioni perdita di fiamma (valore fabbrica = 2 - range impostazione:1 - 2)	Repetition limit loss of flame (default value= 2 - range:1 - 2)	OEM	x	
-	341	Combustibile 1 - Gas: esecuzione controllo tenuta (valore fabbrica = 2) 0 = no controllo tenuta 1 = controllo tenuta in avviamento 2 = controllo tenuta in arresto 3 = controllo tenuta in arresto e in avviamento	 Fuel 1 - Gas: execution proving test (default value= 2) 0 = no proving test 1 = proving test on startup 2 = proving test on shutdown 3 = proving test on shutdown and on startup 	OEM / Service	x	
	342	Combustibile 1 - Gas: tempo evacuazione controllo tenuta (valore fabbrica = 3s - range impostazione:0.2s - 10s)	Fuel 1 - Gas: proving test evacuation time (default value = 3s - range:0.2s - 10s)	OEM	x	
	343	Combustibile 1 - Gas: tempo pressione atmo- sferica controllo tenuta (valore fabbrica = 10s - range impostazione:0.2s - 60s)	Fuel 1 - Gas: proving test time atmospheric pressure (default value = 10s - range:0.2s - 60s)	OEM	x	
	344	Combustibile 1 - Gas: tempo riempimento controllo tenuta (valore fabbrica = 3s - range impostazione:0.2s - 10s)	Fuel 1 - Gas: proving test filling time (default value = 3s - range:0.2s - 10s)	OEM	x	
	345	Combustibile 1 - Gas: tempo test pressione gas (valore fabbrica = 10s - range imposta- zione:0.2s - 60s)	Fuel 1 - Gas: proving test time gas pres- sure (default value = 10s - range:0.2s - 60s)	OEM	x	
22	346	Combustibile 1 - Gas: tempo attesa consenso pressostato di minima (valore fabbrica = 10s - range impostazione:0.2s - 60s) Se la pressione del gas è troppo bassa, in fase 22 non verrà eseguito l'avviamento: il sistema compie un numero impostabile di tentativi finché non si arriva al blocco. Il tempo di attesa tra un tentativo e il succes- sivo viene raddoppiato ad ogni tentativo.	Fuel 1 - Gas: waiting time gas shortage (default value = 10s - range:0.2s - 60s) If the gas pressure is too low, in phase 22 the startup will not be performed: the system tries for a certain number of times the it locks out. The time interval between two attempts is doubled at each attempt.	OEM	x	
-	348	Combustibile 1 - Gas: Tempo di post-ventila- zione 3 (abortito con regolatore di potenza (LR)-ON	Fuel 1 - Gas: Postpurge time 3 (abortion with load controller (LR)-ON	OEM / Service	x	
	361	Combustibile 1 - Olio: sonda rilevazione fiamma attivo (valore fabbrica = 0) 0 = QRB/QRC 1 = ION / QRA	Fuel 1 - Oil: active detector flame evaluation (default value = 0) 0 = QRB/QRC 1 = ION / QRA	OEM / Service	x	

	362	Combustibile 1 - Olio: preventilazione (valore fabbrica = 1) 1 = attivo 0 = non attivo In ambito civile la norma EN267 rende obbli- gatoria la preventilazione. In ambito indu- striale, vedere i casi in cui la norma EN746-2 prevede la possibilità di non fare la preventila- zione.	Fuel 1 - Oil: prepurging (default value = 1) 0 = deactivated 1 = activated 0 = deactivated WARNING: in the civil field, the prepurge is mandatory according to the standard EN267. In the industrial fiels, check if the pre purge can be avoided according to the standard EN746-2	OEM / Service	x	
	365	Combustibile 1 - Olio: tempo preventilazione (valore fabbrica = 15s - range imposta- zione:15s - 60min)	Fuel 1 - Oil: prepurging time (default value = 15s - range:15s - 60min)	OEM / Service	x	
	366	Combustibile 1 - Olio: tempo preaccensione (valore fabbrica = 2s - range imposta- zione:0.2s - 60min)	Fuel 1 - Oil: preignition time (default value = 2s - range:0.2s - 60min)	OEM / Service	x	
2	367	Combustibile 1 - Olio: tempo di sicurezza 1 (TSA1) (valore fabbrica = 5s - range impo- stazione:0.2 - 15s)	Fuel 1 - Oil: safety time 1 (TSA1) (default value = 5s - range:0.2 - 15s)	OEM	x	
	369	Combustibile 1 - Olio: tempo di risposta a cadute di pressione entro TSA1 e TSA2 (valore fabbrica = 1.8s - range imposta- zione:0.2s - 14.8s)	Fuel 1 - Oil: time to respond to pressure faults in TSA1 and TSA2 (default value = 1.8s - range:0.2s - 14.8s)	OEM	x	
Ĩ	370	Combustibile 1 - Olio: Intervallo 1 (valore fabbrica = 2s - range impostazione:0.2s - 60min)	Fuel 1 - Oil: Interval 1 (default value = 2s - range:0.2s - 60min)	OEM / Service	x	
	371	Combustibile 1 - Olio: tempo di sicurezza 2 (TSA2) (valore fabbrica = 3s - range imposta- zione:0.2 - 10s)	Fuel 1 - Oil: safety time 2 (TSA2) (default value = 3s - range:0.2 - 10s)	OEM	x	
	372	Combustibile 1 - Olio: Intervallo 2 (valore fabbrica = 2s - range impostazione:0.2s - 60min)	Fuel 1 - Oil: Interval 2 (default value = 2s - range:0.2s - 60min)	OEM / Service	x	
-	373	Combustibile 1 - Olio: Tempo postcombu- stione (valore fabbrica = 8s - range imposta- zione:0.2s - 60s)	Fuel 1 - Oil: Postcombustion time (default value = 8s - range:0.2s - 60s)	OEM / Service	x	
	374	Combustibile 1 - Olio: Tempo postventila- zione (valore fabbrica = 0.2s - range impo- stazione:0.2s - 180min)	Fuel 1 - Oil: Postpurging time (default value = 0.2s - range:0.2s - 180min)	OEM / Service	x	
	377	Combustibile 1 - Olio: Pressostato olio di massima / ingressoPOC 0 = inattivo 1= pressostato olio di massima 2= POC	Fuel 1 - Oil: Pressure switch-max/POC input 0 = inactive 1 = pressure switch-max 2 = POC		x	

Limite ripetizioni perdita di fiamma (valore fabbrica = 2 - range impostazione:1 - 2)	Repetition limit value loss of flame (default value = 2 - range:1 - 2)	OEM		х	
Combustibile 1 - Olio: tempo iniezione olio (valore fabbr. = 1)	Fuel 1 - Oil: time oil ignition (default value = 1)				
0 = preaccensione corta (Ph38 - fase pro- gramma 38)	0 = short preignition (Ph38-progr. phase 38)	OEM / Service		х	
1 = preaccensione lunga (con ventilatore) (Ph22 - fase programma 22)	1 = long preignition (with fan) (Ph22 - program phase 22)				
Combustibile 1 - Olio: Tempo di post-ventila- zione 3 (abortito con regolatore di potenza (LR)-ON	Fuel 1 - Oil: Postpurge time 3 (abortion with load controller (LR)-ON	OEM / Service		x	
	Limite ripetizioni perdita di fiamma (valore fabbrica = 2 - range impostazione:1 - 2) Combustibile 1 - Olio: tempo iniezione olio (valore fabbr. = 1) 0 = preaccensione corta (Ph38 - fase pro- gramma 38) 1 = preaccensione lunga (con ventilatore) (Ph22 - fase programma 22) Combustibile 1 - Olio: Tempo di post-ventila- zione 3 (abortito con regolatore di potenza (LR)-ON	Limite ripetizioni perdita di fiamma (valore fabbrica = 2 - range impostazione:1 - 2)Repetition limit value loss of flame (default value = 2 - range:1 - 2)Combustibile 1 - Olio: tempo iniezione olio (valore fabbr. = 1)Fuel 1 - Oil: time oil ignition (default value = 1)0 = preaccensione corta (Ph38 - fase pro- gramma 38)Fuel 1 - Oil: time oil ignition (Ph38-progr. phase 38)1 = preaccensione lunga (con ventilatore) (Ph22 - fase programma 22)Fuel 1 - Oil: Postpurge time 3 (abortion with load controller (LR)-ONFuel 1 - Oil: Postpurge time 3 (abortion with load controller (LR)-ON	Limite ripetizioni perdita di fiamma (valore fabbrica = 2 - range impostazione:1 - 2)Repetition limit value loss of flame (default value = 2 - range:1 - 2)OEMCombustibile 1 - Olio: tempo iniezione olio (valore fabbr. = 1)Fuel 1 - Oil: time oil ignition (default value = 1)OEM0 = preaccensione corta (Ph38 - fase pro- gramma 38)Fuel 1 - Oil: time oil ignition (Ph38-progr. phase 38) 0 = short preignition (With fan) (Ph22 - program phase 22)OEM / Service1 = long preignition (with fan) (Ph22 - program phase 22)Fuel 1 - Oil: Postpurge time 3 (abortion with load controller (LR)-ONOEM / Service	Limite ripetizioni perdita di fiamma (valore fabbrica = 2 - range impostazione:1 - 2)Repetition limit value loss of flame (default value = 2 - range:1 - 2)OEMCombustibile 1 - Olio: tempo iniezione olio (valore fabbr. = 1)Fuel 1 - Oil: time oil ignition (default value = 1)OEM0 = preaccensione corta (Ph38 - fase pro- gramma 38)Fuel 1 - Oil: time oil ignition (Ph38-progr. phase 38) 1 = preaccensione lunga (con ventilatore) (Ph22 - fase programma 22)0 = short preignition (with fan) (Ph22 - program phase 22)OEM / Service1 = long preignition 3 (abortito con regolatore di potenza (LR)-ONFuel 1 - Oil: Postpurge time 3 (abortion with load controller (LR)-ONOEM / Service	Limite ripetizioni perdita di fiamma (valore fabbrica = 2 - range impostazione: 1 - 2)Repetition limit value loss of flame (default value = 2 - range: 1 - 2)OEMxCombustibile 1 - Olio: tempo iniezione olio (valore fabbr. = 1)Fuel 1 - Oil: time oil ignition (default value = 1)OEM / Servicex0 = preaccensione corta (Ph38 - fase pro- gramma 38)Fuel 1 - Oil: time oil ignition (Ph38-progr. phase 38)OEM / Servicex1 = preaccensione lunga (con ventilatore) (Ph22 - fase programma 22)1 = long preignition (with fan) (Ph22 - program phase 22)OEM / ServicexCombustibile 1 - Olio: Tempo di post-ventila- zione 3 (abortito con regolatore di potenza (LR)-ONFuel 1 - Oil: Postpurge time 3 (abortion with load controller (LR)-ONOEM / Servicex
Block 400: Setting air/fuel ratio curves

Param.	Descrizione	Description	Password	LMV20 LMV27	LMV26	LMV37
401	Curve controllo servocomando combustibile (F): si accede alla lista dei punti da impostare (da P0 a P9) - consultare paragrafo "Imposta- zione curve"	Ratio control curve fuel actuator (F): it accesses to the parameter list of the points to be set (P0 to P9) - see paragrapf "Setting the curves"	OEM / Service	х	x	x
402	Curve controllo servocomando aria (A): si accede alla lista dei punti da impostare (da P0 a P9) - consultare paragrafo "Impostazione curve"	Ratio control curve air actuator (A): it accesses to the parameter list of the points to be set (P0 to P9) - see paragraph "Setting the curves"	OEM / Service	х	х	x
403	Curve controllo inverter (F + A): si accede alla lista dei punti da impostare (da P0 a P9) - con- sultare paragrafo "Impostazione curve"	Ratio control curves VSD (curve setting only)	SO		x	x
404	Combustibile 1 - Curve controllo servoco- mando combustibile 1 (F): si accede alla lista dei punti da impostare (da P0 a P9) - consul- tare paragrafo "Impostazione curve"	Fuel 1: Ratio control curves fuel actuator (curve setting only)	SO		х	
405	Combustibile 1 - Curve controllo servoco- mando aria (A): si accede alla lista dei punti da impostare (da P0 a P9) - consultare para- grafo "Impostazione curve"	Fuel 1: Ratio control curves air actuator (curve setting only)	SO		x	
406	Combustibile 1 - Curve controllo inverter (F + A): si accede alla lista dei punti da impostare (da P0 a P9) - consultare paragrafo "Imposta- zione curve"	Fuel 1: Ratio control curves VSD (curve set- ting only)	SO		x	

Block 500: Air/fuel ratio control

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Param.	Descrizione	Description	Password	LMV20 LMV27	LMV26	LMV37
501	Posizione servocomando combustibile in assenza di fiamma (no-flame) Indice 0 = posizione di sosta = 0° Indice 1 = posizione preventilazione = 0° Indice 2 = posizione postventilazione = 15°	No-flame position fuel actuator Index 0 = no-load position = 0° Index 1 = prepurge position = 0° Index 2 = postpurge position = 15°	OEM / Service	x	x	x
502	Posizione servocomando aria in assenza di fiamma (no-flame) Indice 0 = posizione di sosta = 0° Indice 1 = posizione preventilazione = 90° Indice 2 = posizione postventilazione = 45°	No-flame position air actuator Index 0 = no-load position = 0° Index 1 = prepurge position = 90° Index 2 = postpurge position = 45°	OEM / Service	x	x	x
503	 % giri motore con inverter 0% = ventilatore fermo, 100% = ventilatore al massimo della velocità Indice 0 = posizione di sosta = 0% Indice 1 = posizione preventilazione = 100% Indice 2 = posizione postventilazione = 50% 	No-flame speeds VSD Index 0 = no-load speed = 0% Index 1 = prepurge speed = 100% Index 2 = postpurge speed = 50%	OEM / Service		x	x
504	Combustibile 1 - Posizione servocomando combustibile in assenza di fiamma (no- flame) Indice 0 = posizione di sosta = 0° Indice 1 = posizione preventilazione = 0° Indice 2 = posizione postventilazione = 15°	Fuel 1 No-flame position fuel actuator Index 0 = no-load position = 0° Index 1 = prepurge position = 0° Index 2 = postpurge position = 15°	OEM / Service		x	
505	Combustibile 1 - Posizione servocomando aria in assenza di fiamma (no-flame) Indice 0 = posizione di sosta = 0° Indice 1 = posizione preventilazione = 90° Indice 2 = posizione postventilazione = 45°	Fuel 1 No-flame position air actuator Index 0 = no-load position = 0° Index 1 = prepurge position = 90° Index 2 = postpurge position = 45°	OEM / Service		x	
506	Combustibile 1 - % giri motore con inverter 0% = ventilatore fermo, 100% = ventilatore al massimo della velocità Indice 0 = posizione di sosta = 0% Indice 1 = posizione preventilazione = 100% Indice 2 = posizione postventilazione = 50%	Fuel 1 No-flame speeds VSD Index 0 = no-load speed = 0% Index 1 = prepurge speed = 100% Index 2 = postpurge speed = 50%	OEM / Service		x	
522	Tempo rampa di salita inverter	Ramp up	OEM / Service		х	x
523	Tempo rampa di discesa inverter	Ramp down	OEM / Service		х	х

	542	Activation of V Width Modulat 0=deactived 1	'SD / PWM fan (F tion) =actived	PWM = Pulse-	Activation of V (PWM = Pulse	SD / PWM fan -Width Modulati	on)	OEM / Service		x	x
					Parame	eter 544					
				Modulation 32s	Modulation 48s	Modulation 64s	Modulation 80s				
544	544	Actuator	Actuating speed param- eter 613	N	Max. delta between the curve points		OEM / Service	x	x	x	
		Actuator (<= 5Nm)	5s / 90°	31°	46°	62°	77°				
		Actuator SQM33.7	17s / 90°	9° (1)	13°	18°	22°	1			
1	(1) in this	case the max.	position of 90° ca	an't be reached							<u> </u>
70	545	Percentuale minima di carico per modulazione (valore fabbrica = n.d range imposta- zione:20%-100%)			Lower load lim range:20%-100	it (default value 0%)	= n.d	OEM / Service	x	x	x
7	546	Percentuale massima di carico per modula- zione (valore fabbrica = n.d range imposta- zione:20%-100%)			Higher load lim range:20%-100	iite (default valu 0%)	e = n.d	OEM / Service	x	x	x
	565	Combustibile 1 - Percentuale minima di carico per modulazione (valore fabbrica = n.d range impostazione:20%-100%)			Fuel 1 Lower load l range:20%-100	imit (default v)%)	ralue = n.d	OEM / Service		x	
	566	Combustibile 1 carico per moc - range impost	1 - Percentuale n dulazione (valore azione:20%-100	nassima di fabbrica = n.d. %)	Fuel 1 Higher load I range:20%-100	imite (default) 0%)	value = n.d	OEM / Service		x	

Block 600: Actuators

Param.	Descrizione	Description	Password	LMV20 LMV27	LMV26	LMV37
601	Impostazione punto di riferimento Indice 0 = combustibile Indice 1 = aria 0 = chiuso (<0°) 1 = aperto (>90°)	Selection of reference point Index 0 = fuel Index 1 = air 0 = closed (<0°) 1 = open (>90°)	OEM	x	x	x
602	Direzione rotazione del servocomando Indice 0 = combustibile Indice 1 = aria 0 = antiorario 1 = orario VEDI MESSAGGIO DI "ATTENZIONE" RIPORTATO SOTTO.	Actuator's direction of rotation Index 0 = fuel Index 1 = air 0 = counterclockwise 1 = clockwise SEE "WARNING" MESSAGE QUOTED BELOW.	OEM	x	x	x
606	Limite tolleranza per monitoraggio posizione (0.1°) Indice 0 = combustibile Indice 1 = aria	Tolerance limit of position monitoring (0.1°) Index 0 = fuel Index 1 = air	OEM / Service	x	x	x
608	Combustibile 1 - Impostazione punto di riferi- mento Indice 0 = combustibile Indice 1 = aria 0 = chiuso (<0°) 1 = aperto (>90°)	Fuel 1 : Selection of reference point Index 0 = fuel Index 1 = air 0 = closed (<0°) 1 = open (>90°)	OEM		x	
609	Combustibile 1 - Direzione rotazione del ser- vocomando Indice 0 = combustibile Indice 1 = aria 0 = antiorario 1 = orario VEDI MESSAGGIO DI "ATTENZIONE" RIPORTATO SOTTO.	Fuel 1 : Actuator's direction of rotation Index 0 = fuel Index 1 = air 0 = counterclockwise 1 = clockwise SEE "WARNING" MESSAGE QUOTED BELOW.	OEM		x	
610	Combustibile 1 - Limite tolleranza per monito- raggio posizione (0.1°) Indice 0 = combustibile Indice 1 = aria	Fuel 1 : Tolerance limit of position monitoring (0.1°) Index 0 = fuel Index 1 = air	OEM / Service		x	

611	Tipo di riferimento dei servocomandi index 0 = fuel (default = 0 (riferimento stan- dard) index 1 = air (default = 0 (riferimento stan- dard) 0 = standard 1 = fermo entro il raggio utile 2 = fermi interni (SQN1) 3 = entrambi	Type of referencing Index 0 = fuel Index 1 = air 0 = standard 1 = stop within usable range 2 = internal stop (SQN1) 3 = both	OEM	x	x	x
612	Combustibile 1 - Tipo di riferimento del servo- comando combustibile 0 = standard 1 = fermo entro il raggio utile 2 = fermi interni (SQN1) 3 = entrambi	Fuel 1: Type of reference for fuel actuator 0 = standard 1 = range stop in the usable range 2 = internal range stop (SQN1) 3 = both	OEM		x	
613	Tipo di servocomando Indice 0 = combustibile Indice 1 = aria 0 = 5s / 90° (1Nm, 1,2Nm, 3Nm) 1 = 10s / 90° (6Nm) 2 = 17s / 90° (10Nm)	Type of actuator Index 0 = fuel Index 1 = air 0 = 5 s / 90° (1Nm, 1,2Nm, 3Nm) 1 = 10 s / 90° (6Nm) 2 = 17 s / 90° (10Nm)	OEM	x	x	x
614	Combustibile 1 :Tipo di servocomando Indice 0 = combustibile Indice 1 = aria $0 = 5s / 90^{\circ} (1Nm, 1,2Nm, 3Nm)$ $1 = 10s / 90^{\circ} (6Nm)$ $2 = 17s / 90^{\circ} (10Nm)$	Fuel 1 : Type of actuator Index 0 = fuel Index 1 = air 0 = 5 s / 90° (1Nm, 1,2Nm, 3Nm) 1 = 10 s / 90° (6Nm) 2 = 17 s / 90° (10Nm)	OEM		x	
641	Attivazione procedura di standardizzazione inverter (riferirsi al codice errore 82) 0 = standardizzazione disattivata 1 = standardizzaione attivata	Control of speed standardization of VSD Error diagnostics of negative values (refer to error code 82)0 = no speed standardization 1 = speed standardization active			x	x

	Configurazione uscita analogica % di carico (valore fabbrica = 0)	Configuration of analog output (default value = 0)		7		
645	0 = DC 010 V	0 = DC 010 V	OEM / Service	1V2	х	х
	1 = DC 210 V	1 = DC 210 V				
	2 = DC 0/210 V	2 = DC 0/210 V				



ATTENTION: as for SQM3x actuators, set the direction according to the acutator function. As far as SQN1x actuators, set **always** the counterclockwise direction, independently from the model chosen for the specific function.

Block 700: Error history

Param.	Descrizione	Description	Password
701	Storico errori: 701 - 725.01.codice	Error history: 701 - 725.01.code	Service / Info
0	Storico errori: 701 - 725.02.codice diagnostico	Error history: 701 - 725.02.diagnostic code	Service / Info
0	Storico errori: 701 - 725.03.classe errore	Error history: 701 - 725.03.error class	Service / Info
0	Storico errori: 701 - 725.04.fase	Error history: 701 - 725.04.phase	Service / Info
0	Storico errori: 701 - 725.05.contatore avvii	Error history: 701 - 725.05.startup counter	Service / Info
725	Storico errori: 701 - 725.06.carico	Error history: 701 - 725.06.load	Service / Info

Param.	Descrizione	Description	Password
	Potenza attuale (valore fabbrica = 0% - range	Current output (default value = 0% - range =	
903	impostazione = 0-100%)	0-100%)	Service / Info
000	Indice 0 = combustibile	Index 0 = fuel	
	Indice 1 = aria	Index 1 = air	
922	Posizione incrementale servocomandi (valore fabbrica = 0% - range impostazione = -50% - 150%)	Incremental position of actuators (default value = 0% - range = -50% - 150%)	Service / Info
022	Indice 0 = combustibile	Index 0 = fuel	
	Indice 1 = aria	Index 1 = air	
935	Giri motore assoluti	Absolute speed	OEM / Service
936	Giri motore in fase standardizzazione	Standardized speed	Service / Info
942	Sorgente potenza attiva	Active load source	OEM / Service
	Solo con LMV26:	Actual fuel	
945	Combustibile attuale	0 = fuel 0	Conviso / Info
343	0 = combustibile 0	1 = fuel 1	Service / Inio
	1 = combustibile 1		
947	Risultato interrogazione contatti (codifica bit)	Result of contact sensing (bit-coded)	Service / Info
950	Stato relè (codifica bit)	Required relay state (bit-coded)	Service / Info
	Intensità di fiamma (0% ÷ 100%);	Intensity of flame (range = 0% - 100%)	
054	minima corrente 30% = 4µA;	minimum current 30% = 4µA;	Conviso / Info
904	massima corrente100% = 16µA;	maximum current100% = 16µA;	Service / Inio
	massima corrente ammissibile = 40µA.	maximum current possible = 40µA.	
961	Stato moduli esterni e display	Status of external modules and display	Service / Info
981	Errore memoria: codice	Error memory: code	Service / Info
982	Errore memoria: codice diagnostica	Error memory: diagnostic code	Service / Info
992	Flag di errore	Error Flags	OEM / Service

Actuators references

An incremental transducer is used to ensure position feedback. Referencing of the actuators must be performed after power-on. In addition, at the end of each shutdown in phase 10, the actuators are referenced to ensure that individual stepping errors, which could lead to shutdown, do not accumulate. If a position error occurs, the system switches to the safety phase (phase 01), enabling the actuators with detected position errors to be referenced. During the following phase 10, the only actuators that are referenced are those that were not referenced before in the safety phase (phase 01). The position of the reference point can be selected depending on the type of burner design, either the CLOSED position ($<0^\circ$) or the OPEN position ($>90^\circ$).



Param.	Descrizione	Description	Password
	Impostazione punto di riferimento	Selection of reference point	
	Indice 0 = combustibile	Index 0 = fuel	
601	Indice 1 = aria	Index 1 = air	OEM
	0 = chiuso (<0°)	0 = closed (<0°)	
	1 = aperto (>90°)	1 = open (>90°)	

If the acutators position is exchanged (error code: 85), the burner will lockout and will try to adjust for three times, then it will lock out.

Gas proving system

Valve proving is only active when firing on gas. This is a leakage test designed to detect leaking gas valves and, if necessary, to prevent the valves from opening or ignition from being switched on. Lockout is initiated. When performing valve proving, the gas valve on the burner side is opened first to bring the test space to atmospheric pressure. Then, the valve is closed whereupon the pressure in the test space must not exceed a certain level, measured by the gas leakage pressure switch (PGCP). Then, the gas valve on the mains side is opened to fill the gas pipe. When the valve is closed again, the gas pressure must not drop below a certain level. Valve proving can be parameterized to take place on startup, shutdown, or on both phases.

Air-fuel curve points

There are 10 air-fuel curve points: T

P0 = ignition position. Only for ignition; after the ignition, the burner works between Point P1 (low flame) and point P9 (high flame) without going back to P0.

P0 can be set everywhere irrespective of all the other points.

COMMISSIONING THE BURNER

The LMV2x complete programming must be performed on units that has never been set before or reset units (e.g. spare parts). The programming procedure is performed by setting the following main parameters:

- 1 if LMV.. is a spare part, insert burner ID (parameter **113**) at least 4 digit.
- 2 type of fuel train (parameter "201")
- 3 air/fuel ratio curvepoints (Block "400")
- 4 maximum load percentage (parameter "546")
- 5 minimum load percentage (parameter "545")



CAUTION: if an error message as "Loc.." appears when the unit is turned to on for the first time, press ENTER (InFo) until the "Reset" message apperas. After few seconds, the message "OffUpr" will be displayed.

This message shows that the unit has not been programmed before or that the operating mode (fuel train) is not set yet or that the unit

has not been completely programmed. Pree keys **F** (Fuel) and **A** (Air) $\int_{r}^{\infty} \int_{a}^{\infty}$ at the same time unit the display shows **code** and next it will show 7 bars the first on the left is flashing. If the display shows "Off", it means that the unit already set, then see the instructions on chapter "Adjusting the burner with LMV2x already programmed").

At the first LMV startup, the AZL display will show



It means that the unit was never set or that no mode was chisen or that some parameters have to be set furthert. Push F (fuel) and A (Air) together until the display shows **code** and then a 7 digit dashed line blinking on the left.



Press the "+" key until the first character of the password (the default password is 9876), then press ENTER (InFo), the character now turn to a bar while the second bar starts flashing. Press "+" until the second character is entered, then press ENTER (InFo). Repeat the procedure until the last character si set, then press ENTER (InFo), then ENTER again until the message PArA appears: then the first parameters block ("400") will be shown:



Press ENTER (InFo) again, to gain access to programming the operating mode (fuel train):



In the example, set configuration **1** = direct gas ignition (G mod). Other possibilities are below listed:

Param.	Descrizione	Description	Password
201	Modalità funzionamento bruciatore (rampa comb., mod. / multistadio, servocom., ecc.) = non definito (cancellazione curve)= 1 = accensione diretta a gas (G mod) 2 = accensione tramite pilota gas con attacco tra le due elettrovalvole EV1/EV2 gas (Gp1 mod) 3 = accens. tramite pilota gas con attacco a monte dell'elettrov. EV1 del gas (Gp2 mod) 4 = accensione a gasolio - modul. (Lo mod) 5 = accens. a gasolio - bistadio (Lo 2 stage) 6 = accens. a gasolio - tristadio (Lo 3 stage)	Burner operating mode (fuel train, mod / multi- stage, actuators, etc.) = undefined (delete curves) 1 = gas direct ignition(G mod) 2 = gas pilot ignition with connection between the two gas solenodi valves EV1/EV2 (Gp1 mod) 3 = gas pilot ignition with connection upstrem the gas solenoid valve EV1 (Gp2 mod) 4 = Light Oil - modulating (Lo mod) 5 = Light Oil - 2stages (Lo 2 stage) 6 = Light Oil - 3stages (Lo 3 stage)	OEM / Service



Lo 3-stage



In the example the Gmod gas train has been set (Configuration "1").

Choose the fuel train by pressing ENTER, then press "+" / "-". Press ENTER to confirm: number "1" will appear on the right side of the display.

: 20	

Press "+" to show the first point to be set P0.

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Press **F** and "+" to increase the opening angle of the fuel actuator "**0F**" until the requested value is reached (for example $12^{\circ} \div 15^{\circ}$, see below) for the ignition point; or press **F** and "-" to decrease the angle:

R) (really)	$\gamma \simeq$	œ	ZX	5		
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		• •	ים		<u> </u>		4
H.	75	V	h	min	s	%	X

To set the air damper opening angle "0A" in the ignition point (10° for example - see below), press "A" and "+" "A" and "-" at the same time:

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P °□ √				8	8			
	$\nabla$	$\triangle$	V	h	min	s	%	¥

LMV37:

Now the air and fuel quantities are set at the ignition point P0:

By pressing "+", point P9 can be programmed to set the air and fuel values at the maximum output

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5	1							
	$\nabla$	"∆"	V	h	min	s	%	¥

go on as described above to the the opening angles of the air actuator (A) and fuel actuator (F):





**CAUTION:** at the first burner adjustment, it is recommended to set the maximum output P9 at the same value (or little higher) of the ignition point, in order to safely reach point P9 next (see next paragraph).

By pressing "+" the display will show:



The burner is ready to startup. Now it is possible to re-set the curve points while the burner is operating ("warm setting") by pressing the ENTER (InFo) or while the burner is in stand-by mode ("cold setting") by pressing ENTEF .

#### Warm setting

- 1 Once pressed button "enter" and the chain thermostats open (X5-03 terminals), the LMV.. show Ph12. Then close the chain termostat and the unit performs the prepurge cycle (see "Phases List") and stops at the ignition point P0 without ignition anyway.
- 2 By pressing "+", the burners lights abd the air/fuel ratio can be properly set in presence of flame.
- 3 By pressing "+" again, the next point P1 is shown (eqaul to P0 as the unit automatically set P0=P1);
- 4 By pressing "+" again, the "Calc" message will be displayed: the unit is processing the sir/fuel ratio curvepoints until point P9, previuosly set. Once the processing is performed the calculated point P2 is shown.By pressing "+" again, the "Calc" message will be displayed: the unit is processing the sir/fuel ratio curvepoints until point P9, previuosly set. Once the processing is performed the calculated point P2 is shown.
- 5 By pressing "+", it is possible to go through the processed curve until point P9 is reached.
- Note: if the point doesn't blink, servomotors are still running.
- 6 n order to set P9 with the gas flow rate according to the generator needs, follow this procedure:

#### Note: the purpose is to fully open the gas throttle and later on to adjust the gas flow rate through the gas pressure governor.

- Operate smoothly opening by just a few degrees the air damper and later on increasing the gas throttle opening it by a few degrees. Keep monitoring the flue through the flue analyser. Keep the air excess inside normal figures (from 3% to 7% residual O2) operating by means for the air damper servomotor;
- Keep increasing the air damper opening and then the gas throttle, as done in the sequence above, remebering to get the full firing
  rate wih the gas throttle fully open (or the oil pressure regulator at its maximum pressure position).
   See example below:



- If, while opening the gas throttle, the gas flow rate was too high, reduce it only through the gas governor and keep opening the throttle until the 60÷70° position is got.
- If the gas train is equipped with a governor and a valve with an adjustable gas flow rate, fully open also this last valve, smoothly! The gas flow rate is always set by means of the governor.
- 7 As soon as all the devices are fully open, set the gas flow rate through the governor.
- 8 Set the air damper position in order to get the reccomended air excess (3÷4.8% O2 on gas and 2.9÷4.9% on oil).

Note1: on high flame, if the gas flow rate is changed by means of the governor, all the other points below high flame must be checked again.

9 After having set the high flame point P9, keep "-" pressed for some seconds unitl "Calc" is displayed in order to have the LMV recalculating all the points:



- 10 the unit will automatically reach point P8 processed: check the combustion values in this point and, if necessary, change it.
- 11 Press "-" to go down to the lower points and check the combustion values, change the points if necessary.

Note: if in an intermediate point (for example P5), the change of the actuators position is important according to the processed point

P5, keep pressing "-" unitl "Calc" is displayed. The curve will be processed again downwards point P1.



- 12 press "-" to go through the lower points and check the combustion values, if necessary change the points as described above.
- 13 By pressing ESC, at the end of the points adjusments, the parameter "**546**" (setting the maximum load) will be displayed; press ENTER (InFo), then "+" until 100%, then press ENTER (InFo) again, ESC and then "+".



14 The parameter "**545**" (setting the minimum load) is displayed: press ENTER (InFo), then "+" until 20%. Press ENTER, then press ESC for three times. The message "oP" will be displayed as well as the load percentage at the burner is working on.



he hyphen related to the symbol "P" (highlited in the picture) will be off to show that the unit exited the programmig mode. The burner will then work automatically, following the curve set.

.Note1: if the curvepoints settings is quit before end (by pressing ESC or for a faulty shutdown), the message "OFF UPr" (Start prevention) will be diplayed until all the curvepoints will be set.

**Note2:** if the gas flow rate at high flame point (maximum load) is changed by means of the pressure stabiliser, all the curvepoints must be checked by going through the curve downwards and resetting them if necessary.

Note3: if the point does not flash, it means thet the actuators have not reached the set position yet.

Note4: if an error occurs causing a safety shutdwon during the processing of the curve, the processing itself will be interrupted.

### Cold setting

The "cold setting" (without flame) can be performed only when all the curve points values are known (for instance, in case of replacement).



When the burner is off, if you modify one curve set point, when the burner restarts the AZL2x shows OFF UPr (OFF UPr0 or OFF UPr1 for LMV26). The LMV.. then, requires a new "warm" startup (see procedure paragraph "Warm Setting") by checking again all points of curve from P0 to P9.

## BURNER STARTUP WITH LMV2x ALREADY PROGRAMMED

Once the LMV turns on, the AZL display will show



The burners is basically factory set. The air/fuel ratio curve is set with the maximum output point P9 a little higher or equal to P0. To adjust the burner on the plant site, adjust the maximum output point to the flow rate values really requested. Then go through the curve-points, by pressing "+" several times to reach point P9: then adjust the air actuator position (for the air damper) and the fuel actuator (for the butterfly valve, in case of gas or the oil pressure governor incase of oil), by adjusting the fuel flow rate by means of the gas pressure stabiliser (for gas) or the oil pressure governor (for oil), checking the combustion values contemporarly. Once the burner is adjusted at the maximum output, press "-" for more than 5 seconds to process the curve downwards. The curve is then a straight line: go on checking the combustion values point by point; change them if necessary and in case linearise the curve again.

Before starting the burner up, press F and A at the same time



enter the password following the procedure on chapter "Programming LMV2x". Press ENTER until the display will show:



Press ENTER again: it will show

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press ENTER (InFo)

: the display will show phase 12.

Ph12: *Standby* phase (stationary) Ph12: *Standby* phase (stationary)

By closing the thermostatic series, the burner startup cycle will take place:

- Ph22: Fan ramp up phase (fan motor = ON, safety shutoff valve = ON)
- Ph24: Traveling to prepurge position phase
- Ph30: Prepurge phase
- Ph36: Traveling to ignition position phase
- Ph38: Preignition phase
- Ph40: 1st safety time phase (ignition transformer ON)
- Ph42: 1st safety time phase (ignition transformer OFF), preignition time OFF

Ph44: Interval1

The startup sequence stops at phase 44.

The burners is lit and is in"P1" position (low flame point):



Set the air/fuel ratio curvepoints as described on chapter "Programming the LMV2x"

**Note:** the other phases are Ph60 = operation (OP= in modulation) Ph62 = travelling to shutdown Ph70 = off but in prepurge after the burntime

- Ph72 = travelling to postpurging
- Ph74 = postpurge (countdown is displayed)

Press ESC  $\stackrel{\text{line}}{\xrightarrow{}}$  the parameter "546" (Setting the maximum load) is displayed

Then press  $\overbrace{-}^{\text{min}}$  to exit the programming mode. The display will show:



Press  $\overset{\frown}{\xrightarrow{}}_{+}^{\infty}$  for a second time: the display will show the load percentage the burner is working at.

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When the generator reaches the programmed set-point, the burner will be in stand-by: the display will show

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	$\nabla$	$\triangle$	V	h	min	s	%	¢

# Reset / manual lockout

The system can be manually locked by simultaneously pressing the **ENTER (InFo)** button and **any other button** on the AZL2.... This function allows the user to stop the system from the operating level should an emergency occur. When making a reset, the following actions are carried out:

- Alarm relay and the fault display are off
- the lockout position is cancelled
- the unit performs a reset, then it switches to stand-by

If the unit is in the lockout position, a reset can be made by pressing the **InFo** button for 1...3 seconds. The function is available only when the unit is in the lockout position. Longer or shorter pushes on the button do not produce a reset so that the system maintains the lockout position.

Codice errore / Error code	Codice diagnostico / Diagnostic code	Descrizione / Meaning
167	2	/ Manual lockout via AZL2

#### Timeout for menu operation

The time for automatically leaving the parameter setting level can be adjusted between 10 and 120 minutes, using the parameter 127 (Timeout for menu operation). If, during that period of time, there is no operation via the AZL2..., the parameter setting level is quit and the password level reset to *Info / Service*.

Caution! In addition, this timeout or interruption of communication between the LMV2.. and the AZL2... during the time the curves are set leads to lockout!

Codice erroreC Error code	Codice diagnostico Diagnostic code	DescrizioneMeaning			
167	8	Manual locking			

# Entering the Parameter levels

By means of a proper use of the keys, it is possible to enter the various level parameters, as shown in the following flow chart:



The burner and consequently the LMV2x.. are factory set; the air and fuel curves as set as well.

## Info level

To enter the Info level, proceed as follows:

1 in any menu position, press keys + and - at the same time, then the program will start again: the display will show OFF.



2 , until the display will show InFo, Press the enter (InFo) key



- 3 then il will show the first code (167) flashing, on the right side it will show the data entered. By pressing + or it is possible to scroll (up or down) the parameter list.
- 4 If a dot-line is shown on the right, there is no enough room for complete visualisation: press enter again the data will be completely shown for 1 to 3 seconds. By pressing enter or + and- at the same time, the system will exit the parameter visualisation and go back to the flashing number. The Info level shows some basic parameters as:

Parameter	Description
167	Cubic meters of fule (resettable)
162	Operating hours (resettable)
163	Device operating hours
164	Burners start-ups (resettable)
166	Total number of start-ups
113	Burner number (i.e. serial number)
107	Software version
102	Software date
103	Device serial number
104	Customer code
105	Version
143	Free

5 Example: choose parameter 102 to show the date



the display shows parameter 102 flashing on the left and characters ._._ on the right.

- 6 press InFo for 1-3 seconds: the date will appear
- 7 press InFo to go back to parameter "102"
- 8 by pressing + / -, it is possible to scroll up/down the parameter list (see table above), or, by pressing ESC or InFo for more seconds, the display will show
- 9 Once the last parameter is accessed (143) by pressing + , the End message will flash.

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10 Press InFo and for more than three seconds or for more than three seconds orto return to the normal display.



If a message like the one below is shown during operation,



it means that the burner is locked out and the Errore code is shown (in the example "error code:4"); this message is alternating with another message



Diagnostic code (in the example "diagnostic code:3"). Record the codes and find out the fault in the Error table To perform the reset, press InFo for one second:



The unit displays an event which does not lead to shutdown.

The display shows current error code c: alternating with diagnostic code d:



Press **InFo** to return to the display of phases. Example: Error code **111** / diagnostic code 0

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P °Ĩ	E		E	:8	Ū.	Ø	8	7
~	$\nabla$		V	h	min	s	%	₹

To reset, press InFo for a second. Record the codes and check the Error List to find the type of faults.

# Service level

To enter the Service mode, press InFo until the display will show:

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P î	Ī	1.	Ā	5	E	R	Ā	B	P
2	7	7		V	h	min	s	%	≧ ≹

The service level shows all the information about flame intensity, actuators position, number and lock codes:

Parameter	Description	
954	Flame intensity	
121	% output, if set = automatic operation	
922	Actuators position, 00=combustibile; 01= aria	
161	Lock-outs number	
701725	Lock-outs History (see chapter 23 in the LMV2x manual)	



- 1 the first parameter will be "954": the percentage of flame is shown on the right. By pressinf + or it is possible to scroll up/down the parameter list.
- 2 Once the last parameter is accessed (143) by pressing + , the **End** message will blink.

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	$\bigtriangledown$	$\triangle$	V	Ы	nNn	s	%	¥

3 Press InFo. for more than three seconds or for more than three seconds orto return to the normal display.

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Ś	Ľ		<u> </u>	2				
	$\nabla$	$\triangle$	V	h	min	s	%	¥

# PHASES LIST

Fase /Phase	Funzione	Function
Ph00	Fase blocco	Lockout phase
Ph01	Fase di sicurezza	Safety phase
Ph10	t10 = tempo raggiungimento posizione riposo	t10 = home run
Ph12	Pausa	Standby (stationary)
Ph22	t22 = tempo di salita ventilatore (motore ventilatore = ON, valvola intercettazione di sicurezza = ON)	t22 = fan ramp up time (fan motor = ON, safety shutoff valve = ON)
Ph24	Verso posizione preventilazione	Traveling to the prepurge position
Ph30	t1 = tempo preventilazione	t1 = prepurge time
Ph36	Verso posizione accensione	Traveling to the ignition position
Ph38	t3 = tempo preaccensione	t3 = preignition time
Ph40	TSA1 = primo tempo sicurezza (trasformatore accensione ON)	TSA1= 1st safety time (ignition transformer ON)
Ph42	TSA1 = primo tempo sicurezza (trasformatore accensione OFF)	TSA1 = 1st safety time (ignition transformer OFF), t42 = preignition time OFF
Ph44	t44 = intervallo 1	t44 = interval 1
Ph50	TSA2 = secondo tempo sicurezza	TSA2 = 2nd safety time
Ph52	t52 = intervallo 2	t52 = interval 2
Ph60	Funzionamento 1 (stazionario)	Operation 1 (stationary)
Ph62	t62 = massimo tempo bassa fiamma (funzionamento 2, in preparazione per spegnimento, verso bassa fiamma)	t62 = max. time low-fire (operation 2, preparing for shutdown, traveling to low-fire)
Ph70	t13 = tempo postcombustione	t13 = afterburn time
Ph72	Verso posizione postcombustione	Traveling to the postpurge position
Ph74	t8 = tempo postventilazione	t8 = postpurge time
Ph80	t80 = tempo evacuazione controllo tenuta valvole	t80 = valve proving test evacuation time
Ph81	t81 = tempo perdita pressione atmosferica, prova atmosferica	t81 = leakage time test time atmospheric pres- sure, atmospheric test
Ph82	t82 = test perdita, test riempimento	t82 = leakage test filling test, filling
Ph83	t83 = tempo perdita pressione gas, test pressione	t83 = leakage test time gas pressure, pressure test
Ph90	Tempo attesa "mancanza gas"	Gas shortage waiting time

# BACKUP PARAMETER WITH AZL2x

On the AZL2x you can save the configuration to download on another appliance LMV. To do this:

access up, press F and A at the same time



enter the password following the procedure on chapter "Programming LMV2x". Press ENTER until the display will show:



# **RESTORE PARAMETER FROM AZL2x TO LMV..**

To copy the previously saved configuration on AZL2x proceed as follows: access up, press F and A at the same time





enter the password following the procedure on chapter "Programming LMV2x". Press ENTER until the display will show:





After about 5 seconds the restore process ends and the display shows Now, LMV has the same configuration that was stored on AZL2x.

# ERROR CODE TABLE

Error code	Diagnostic code	Meaning for the LMV2x/3x system	Remedy
no Comm		No communication between LMV26 basic unit and AZL2	Check wiring for line interruption/loose contact
2	#	No flame at the end of safety time (TSA)	
	1	No flame at the end of safety time 1 (TSA1)	
	2	No flame at the end of safety time 2 (TSA2)	
3	#	Air pressure failure	
	0	Air pressure off	
	1	Air pressure on	
	4	Air pressure on – prevention of startup	
	20	Air pressure, combustion pressure – start prevention	
	68	Air pressure, POC – start prevention	
	84	Air pressure, combustion pressure, POC – start preven- tion	
4	#	Extraneous light	
	0	Extraneous light during startup	
	1	Extraneous light during shutdown	
	2	Extraneous light during startup – prevention of startup	
	6	Extraneous light during startup, air pressure – start pre- vention	
	18	Extraneous light during startup, combustion pressure – start prevention	
	24	Extraneous light during startup, air pressure, combus- tion pressure – start prevention	
	66	Extraneous light during startup, POC – start prevention	
	70	Extraneous light during startup, air pressure, POC – start prevention	
	82	Extraneous light during startup, combustion pressure, POC – start prevention	
	86	Extraneous light during startup, air pressure, combus- tion pressure, POC – start prevention	
7	#	Loss of flame	
	0	Loss of flame	
	3255	Loss of flame due to TÜV test (loss-of-flame test)	Diagnostics corresponds to the period of time from shutdown of fuel valves to the detection of loss of flame (resolution 0.2 s $\rightarrow$ Value 5 = 1 s)

Error	Diagnostia anda	Manning for the LMV/20 another	Demodu
code	Diagnostic code	meaning for the LMV20 system	Remedy
12	#	Valve proving	
			With valve proving via X5-01 (gas pressure switch-min)
		Fuel valve 1 (V1) leaking	- Check if valve on the burner side is leaking
	0	(fuel valve 2 with valve proving via X5-01)	- Check if pressure switch for valve proving is closed, if gas pressure exist
			- Check wiring for short-circuit
		Evel valve 2 (V2) leaking	With valve proving via X5-01 (gas pressure switch-min)
	1	Fuel valve 2 (V2) leaking	- Check if valve on the gas side is leaking
		(nuel valve 1 with valve proving via x3-01)	- Check wiring for short-circuit
	2	Value proving not possible	Valve proving activated, but pressure switch-min selected as input function for X9-04 (check
	2	valve proving not possible	parameters 238 and 241)
	3	Valve proving not possible	Valve proving activated, but no input assigned (check parameters 236 and 237)
	4	Valve proving not possible	Valve proving activated, but 2 inputs assigned (set parameter 237 to pressure switch-max or POC)
	5	Valve proving not possible	Valve proving activated, but 2 inputs assigned (check parameters 236 and 237)
	84	V4 looking	Check to see if the valve on the gas side is leaking
	01	V1 leaking	Check wiring to see if there is an open-circuit
			Check to see if the valve on the burner side is leaking
	83	V2 leaking	Check to see if the pressure switch for the leakage test is closed when gas pressure is present
			Check wiring for short-circuit
14	#	POC	
	0	POC open	Check to see if the valve's closing contact is closed
		ROC alass	Check wiring
	1	POC close	Check to see if the valve's closing contact opens when valve is controlled
	64	POC open_start provention	Check wiring to see if there is a line interruption.
	04	POC open - start prevention	Check to see if the valve's closing contact is closed
19	80	Combustion pressure POC - start prevention	Check to see if pressure switch has closed with no combustion pressure present
15		Combustion pressure, POC – start prevention (	Check wiring for short-circuit
20	#	Pressure switch-min (Pmin)	
	0	No minimum gas /oil pressure	Check wiring for open-circuit
	1	Gas shortage – start prevention	Check wiring for open-circuit
21	#	Pressure switch-max / POC	
	0	Pressure switch-max: Max. gas / oil pressure exceeded	Check wiring to see if there is a line interruption.
	POC: POC open (software version ≤ V02.00		POC: Check to see if the valve's closing contact is closed.

Error	Diagnostic code	Meaning for the LMV2x/3x system	Remedy
code	Contract Contract Contract		
OFF S	#	Safety loop / burner flange	
	0	Safety loop / burner flange open	
	1	Safety loop / burner flange open - prevention of startup	
	3	Safety loop/burner flange, extraneous light – start pre- vention	
	5	Safety loop/burner flange, air pressure – start preven- tion	
	17	Safety loop/burner flange, combustion pressure – start prevention	
	19	Safety loop/burner flange, extraneous light, combustion pressure – start prevention	
	21	Safety loop/burner flange, air pressure, combustion pressure – start prevention	
	23	Safety loop/burner flange, extraneous light, air pressure, combustion pressure – start prevention	
	65	Safety loop/burner flange, POC – start prevention	
	67	Safety loop/burner flange, extraneous light, POC – start prevention	
	69	Safety loop/burner flange, air pressure, POC – start prevention	
	71	Safety loop/burner flange, extraneous light, air pressure, POC – start prevention	
	81	Safety loop/burner flange, combustion pressure, POC – start prevention	
	83	Safety loop/burner flange, extraneous light, combustion pressure, POC – start prevention	
	85	Safety loop/burner flange, air pressure, combustion pressure, POC – start prevention	
	87	Safety loop/burner flange, extraneous light, air pressure, combustion pressure, POC – start prevention	
50	#	Internal error	Make a reset; if error occurs repeatedly, replace the unit
51	#	Internal error	Make a reset; if error occurs repeatedly, replace the unit
55	#	Internal error	Make a reset; if error occurs repeatedly, replace the unit
56	#	Internal error	Make a reset; if error occurs repeatedly, replace the unit
57	#	Internal error	Make a reset; if error occurs repeatedly, replace the unit

Error			
code	Diagnostic code	Meaning for the LMV2x/3x system	Remedy
58	#	Internal error	Make a reset; if error occurs repeatedly, replace the unit
61 Fuel Chg	#	Fuel changeover	
Fuel Chg	0	Fuel 0	No error - change to Fuel 0
Fuel Chg	1	Fuel 1	No error - change to Fuel 1
62 Fuel Err	#	Invalid fuel signals / fuel information	
Fuel Err	0	Invalid fuel selection (Fuel 0 + 1 = 0)	Check wiring to see if there is an open-circuit Note Curves cannot be set.
Fuel Err	1	Different fuel selection between the µCs	Make a reset; if error occurs repeatedly, replace the unit
Fuel Err	2	Different fuel signals between the µCs	Make a reset; if error occurs repeatedly, replace the unit
Fuel Err	3	Invalid fuel selection (Fuel 0 + 1 = 1)	Check wiring for short-circuit Note Curves cannot be set. LMV26: Optional press reset button >3 seconds.
65	#	Internal error	Make a reset; if error occurs repeatedly, replace the unit
66	#	Internal error	Make a reset; if error occurs repeatedly, replace the unit
67	#	Internal error	Make a reset; if error occurs repeatedly, replace the unit
70	#	Internal error fuel-air ratio control: Position calcula- tion modulating	
	23	Output invalid	No valid output
	26	Curvepoints undefined	Adjust the curvepoints for all actuators
71	#	Special position undefined	
	0	Home position	Parameterize the home position for all actuators used
	1	Prepurge position	Parameterize the prepurge position for all actuators used
	2	Postpurge position	Parameterize the postpurge position for all actuators used
	3	Ignition position	Parameterize the ignition position for all actuators used
72	#	Internal error fuel-air ratio control	Make a reset; if error occurs repeatedly, replace the unit
73	#	Internal error fuel-air ratio control: Position calcula- tion multistep	
	23	Output invalid	No valid output
	26	Curvepoints undefined	Adjust the curvepoints for all actuators

Error code	Diagnostic code	Meaning for the LMV2x/3x system	Remedy
75	#	Internal error fuel-air ratio control: Data clocking check	
	1	Current output different	
	2	Target output different	
	4	Target positions different	
	16	Different positions reached	Can be caused by different standardized speeds (e.g. after restore of data set) when the VSD is activated $\rightarrow$ standardize again and check adjustment of the fuel-air ratio control system
76	#	Internal error fuel-air ratio control	Make a reset; if error occurs repeatedly, replace the unit
80	#	Control range limitation of VSD	<ul> <li>Basic unit could not correct the difference in speed and reached a control range limit.</li> <li>1. Basic unit is not standardized for this motor → repeat standardization.</li> <li>Caution!</li> <li>Settings of fuel-air ratio control must be checked.</li> <li>2. Ramp time settings of the VSD are not shorter than those of the basic unit (parameters 522, 523).</li> <li>3. Characteristic of the VSD is not linear. Configuration of the voltage input at the VSD must accord with that of the basic unit (parameter 645).</li> <li>4. VSD does not follow quickly enough the changes of the basic unit. Check settings of the VSD (input filter, slippage compensation, hiding different speeds)</li> </ul>
	1	Control range limitation at the bottom	VSD speed was too high
	2	Control range limitation at the top	VSD speed was too low
81	1	Interrupt limitation speed input	Too much electromagnetic interference on the sensor line $\rightarrow$ improve EMC

Error			
code	Diagnostic code	Meaning for the LMV2x/3x system	Remedy
82	#	Error during VSD's speed standardization	
	1	Timeout of standardization (VSD ramp down time too	Timeout at the end of standardization during ramp down of the VSD
	1	long)	$\rightarrow$ ramp time settings of the VSD are not shorter than those of the basic unit (parameter: 523)
	2	Storage of standardized speed not successful	Error during storage of the standardized speed
	2	Storage of standardized speed not successful	$\rightarrow$ lock the basic unit, then reset it and repeat the standardization
			Basic unit receives no pulses from the speed sensor:
	3	Line interruntion speed sensor	1. Motor does not turn.
	5	Ene menupion speed sensor	2. Speed sensor is not connected.
			3. Speed sensor is not activated by the sensor disk (check distance)
			Motor has not reached a stable speed after ramp up.
			1. Ramp time settings of the VSD are not shorter than those of the basic unit (parameters 522,
			523).
	4	Speed variation / VSD ramp up time too long / speed	2. Characteristic of the VSD is not linear. Configuration of the voltage input at the VSD must
		below minimum limit for standardization	accord with that of the basic unit (parameter 645).
			3. VSD does not follow quickly enough the changes of the basic unit. Check settings of the VSD
			(input filter, slippage compensation, hiding different speeds)
			4. Speed of VSD lies below the minimum for standardization (650 1/min)
			Motor's direction of rotation is wrong.
			1. Motor turns indeed in the wrong direction
	5	Wrong direction of rotation	$\rightarrow$ change parameterization of the direction of rotation or interchange 2 live conductors.
			2. Sensor disk is fitted the wrong way
			→ turn the sensor disk.
			The required pulse pattern (60°, 120°, 180°) has not been correctly identified.
			1. Speed sensor does not detect all tappets of the sensor disk
			→ check distance
	6	Unplausible sensor signals	2. As the motor turns, other metal parts are detected also, in addition to the tappets $\rightarrow$ improve
			mounting.
			3. Electromagnetic interference on the sensor lines
	7	Invalid standardized speed	The standardized speed measured does not lie in the permissible range
			→ motor turns too slowly or too tast
			The speeds of microcomputer 1 and 2 deviated too much. This can be caused by wrong standard-
	15	Speed deviation $\mu$ C1 + $\mu$ C2	ized speeds (e.g. after restoring a data set to a new unit)
			→ repeat standardization and check the fuel-air ratio

Error code	Diagnostic code	Meaning for the LMV2x/3x system	Remedy
	20	Wrong phase of phase manager	Standardization was made in a wrong phase. Permitted are only phases $\leq 12 \rightarrow$ controller OFF, start standardization again
	21	Safety loop / burner flange open	Safety loop or burner flange is open $\rightarrow$ repeat standardization with safety loop closed
	22	Air actuator not referenced	<ul><li>Air actuator has not been referenced or has lost its referencing.</li><li>1. Check if the reference position can be approached.</li><li>2. Check if actuators have been mixed up.</li><li>3. If error only occurs after the start of standardization, the actuator might be overloaded and cannot reach its destination.</li></ul>
	23	VSD deactivated	Standardization was started with VSD deactivated → activate the VSD and repeat standardization
	24	No valid operating mode	Standardization was started without valid operating mode → activate valid operating mode and repeat standardization
	25	Pneumatic air-fuel ratio control	Standardization was started with pneumatic air-fuel ratio control → standardization with pneumatic air-fuel ratio control not possible
	128	Running command with no preceding standardization	VSD is controlled but not standardized → make standardization
	255	No standardized speed available	Motor turns but is not standardized → make standardization

Error code	Diagnostic code	Meaning for the LMV2x/3x system	Remedy
83	#	Speed error VSD	Required speed has not been reached
	Bit 0 Valency 1	Lower control range limitation of control	Speed has not been reached because control range limitation has become active $\rightarrow$ for measures, refer to error code 80
	Bit 1 Valency 23	Upper control range limitation of control	Speed has not been reached because control range limitation has become active $\rightarrow$ for measures, refer to error code 80
	Bit 2 Valency 47	Interruption via disturbance pulses	Speed has not been reached due to too much electromagnetic interference on the sensor line $\rightarrow$ for measures, refer to error code 81
	Bit 3 Valency ≥ 8	Curve too steep in terms of ramp speed	<ul> <li>Speed has not been reached because detected curve slope was too steep.</li> <li>1. With a LMV26 ramp of 20 s, the curve's slope may be a maximum of 10% speed change between 2 curvepoints in modulating mode.</li> <li>With a LMV26 ramp of 10 s, the curve's slope may be a maximum of 20% speed change between 2 curvepoints in modulating mode.</li> <li>With a LMV26 ramp of 5 s, the curve's slope may be a maximum of 40% speed change between</li> <li>2 curvepoints in modulating mode.</li> <li>→ Between the ignition point (P0) and the low-fire point (P1), the speed change in modulating mode may be a maximum of 40%, independent of the LMV26 ramp.</li> <li>2. The setting of the VSD ramp must be about 20% faster than the ramps in the basic unit (parameters 522, 523).</li> </ul>
	Bit 4 Valency ≥ 16	Interruption of speed signal	No speed detected in spite of control. 1. Check if the motor turns. 2. Check if the speed sensor delivers a signal (LED / check distance from the sensor disk). 3. Check wiring of the VSD.
	Bit 5 Valency ≥ 32	Quick shutdown due to excessive speed deviation	Speed deviation was for about 1 s >10% outside the anticipated range. 1. Check ramp times of the LMV26 and VSD. 2. Check wiring of the VSD.

Error code	Diagnostic code	Meaning for the LMV2x/3x system	Remedy
84	#	Curve slope actuators	
	Bit 0 Valency 1	VSD: Curve too steep in terms of ramp speed	<ol> <li>The curve's slope may be a maximum of 10% speed change between 2 curvepoints in modulating operation, with a LMV26 ramp of 20 seconds         The curve's slope may be a maximum of 20% speed change between 2 curvepoints in modulating operation, with a LMV26 ramp of 10 seconds         The curve's slope may be a maximum of 40% speed change between 2 curvepoints in modulating operation, with a LMV26 ramp of 10 seconds         The curve's slope may be a maximum of 40% speed change between 2 curvepoints in modulating operation, with a LMV26 ramp of 5 seconds         → Between the ignition point (P0) and the low-fire point (P1), the speed change in modulating mode may be a maximum of 40%, independent of the LMV26 ramp.         Setting of the VSD ramp must be about 20% shorter than the ramps in the basic unit (parameters 522 and 523)         Output         Description:         Description:</li></ol>
	Bit 1 Valency 23	Fuel actuator: Curve too steep in terms of ramp rate	The slope of the curve may be a maximum position change of 31° between 2 curvepoints in modulating mode
	Bit 2 Valency 47	Air actuator: Curve too steep in terms of ramp rate	The slope of the curve may be a maximum position change of 31° between 2 curvepoints in modulating mode
85	#	Referencing error ones actuators	
	0	Referencing error of fuel actuator	Referencing of fuel actuator not successful. Reference point could not be reached. 1. Check to see if actuators have been mixed up. 2. Check to see if actuator is locked or overloaded.
	1	Referencing error of air actuator	Referencing of fuel actuator not successful Reference point could not be reached. 1. Check to see if actuators have been mixed up. 2. Check to see if actuator is locked or overloaded.
	Bit 7 Valency ≥ 128	Referencing error due to parameter change	Parameterization of an actuator (e.g. the reference position) has been changed. To trigger new referencing, this error is set
86	#	Error fuel actuator	
	0	Position error	Target position could not be reached within the required tolerance band $\rightarrow$ check to see if actuator is locked or overloaded
	Bit 0 Valency 1	Line interruption	Line interruption detected at actuator's terminals $\rightarrow$ check wiring (voltage X54 across pin 5 or 6 and pin 2 >0.5 V)
	Bit 3 Valency ≥8	Curve too steep in terms of ramp rate	The slope of the curve may be a maximum position change of 31° between 2 curvepoints in modulating mode
	Bit 4 Valency ≥ 16	Step deviation in comparison with last referencing	Actuator was overloaded or mechanically twisted. 1. Check to see if the actuator is blocked somewhere along its working range. 2. Check to see if the torque is sufficient for the application.

Error code	Diagnostic code	Meaning for the LMV2x/3x system	Remedy
87	#	Error air actuator	
	0	Position error	Target position could not be reached within the required tolerance band → check to see if actuator is locked or overloaded
	Bit 0 Valency 1	Line interruption	Line interruption detected at actuator's terminals $\rightarrow$ check wiring (voltage X53 across pin 5 or 6 and pin 2 >0.5 V)
	Bit 3 Valency ≥ 8	Curve too steep in terms of ramp rate	The slope of the curve may be a maximum position change of 31° between 2 curvepoints in modulating mode
	Bit 4 Valency ≥ 16	Sectional deviation in comparison with last referencing	Actuator was overloaded or mechanically twisted. 1. Check to see if the actuator is blocked somewhere along its working range. 2. Check to see if the torque is sufficient for the application.
90	#	Internal error basic unit	
91	#	Internal error basic unit	
93	#	Error flame signal acquisition	
	3	Short-circuit of sensor	Short-circuit at QRB 1. Check wiring. 2. Flame detector possibly fault.
95	#	Error relay supervision	
	3 Ignition transformer 4 Fuel valve 1 5 Fuel valve 2 6 Fuel valve 3	External power supply NO contact	Check wiring
96	#	Error relay supervision	
	3 Ignition transformer 4 Fuel valve 1 5 Fuel valve 2 6 Fuel valve 3	Relay contacts have welded	<ul> <li>Test the contacts:</li> <li>1. Unit connected to power: Fan output must be dead.</li> <li>2. Disconnect power: Disconnect fan. No resistive connection between fan output and neutral conductor allowed.</li> <li>If one of the 2 tests fails, release the unit since contact have definitively welded and safety can no longer be ensured.</li> </ul>
97	#	Error relay supervision	
	0	Safety relay contacts have welded or external power supply fed to safety relay	<ul> <li>Test the contacts:</li> <li>1. Unit connected to power: Fan output must be dead.</li> <li>2. Disconnect power: Disconnect fan. No resistive connection between fan output and neutral conductor allowed.</li> <li>If one of the 2 tests fails, release the unit since contacts have definitively welded and safety can no longer be ensured.</li> </ul>

Error	Diagnostic code	Meaning for the LMV2x/3x system	Remedy
98	#	Error relay supervision	
	2 Safety valve 3 Ignition transformer 4 Fuel valve 1 5 Fuel valve 2 6 Fuel valve 3	Relay does not pull in	Make a reset; if error occurs repeatedly, replace the unit
99	#	Internal error relay control	Make a reset; if error occurs repeatedly, replace the unit
	3	Internal error relay control	Make a reset. If error occurs repeatedly, replace the unit Software version V03.10: If error C:99 D:3 occurs during standardization of the VSD, deactivate temporarily function <i>Alarm in case of start prevention</i> (parameter number 210 = 0, when using a release contact) or <i>interrupt</i> the controller-ON signal
100	#	Internal error relay control	Make a reset; if error occurs repeatedly, replace the unit
105	#	Internal error contact sampling	
	0 Pressure switch-min 1 Pressure switch-max / POC 2 Fuel selection 0 / Reset 3 Air pressure 4 Load controller open 5 Load controller on / off 6 Load controller close 7 Safety loop / Burner flange 8 Safety valve 9 Ignition transformer 10 Fuel valve 1 11 Fuel valve 2 12 Fuel valve 3 13 Fuel selection 1 / Reset	Stuck-At failure	Can be caused by capacitive loads or supply of DC voltage to the mains voltage inputs. The diag- nostic code indicates the input where the problem occurred
106	#	Internal error contact request	Make a reset; if error occurs repeatedly, replace the unit
107	#	Internal error contact request	Make a reset; if error occurs repeatedly, replace the unit
108	#	Internal error contact request	Make a reset; if error occurs repeatedly, replace the unit
110	#	Internal error voltage monitor test	Make a reset; if error occurs repeatedly, replace the unit
111	#	Power failure	Mains voltage to low Exchange ratio diagnostics code → voltage value (230 V: 1.683)
112	0	Mains voltage recovery	Error code for triggering a reset on power restoration (no error)
113	#	Internal error mains voltage supervision	Make a reset; if error occurs repeatedly, replace the unit
115	#	Internal error system counter	
116	0	Designed life time exceeded (250'000 startups)	Warning threshold has been reached. The unit should be replaced
Error code	Diagnostic code	Meaning for the LMV2x/3x system	Remedy
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117	0	Life time exceeded Operation no longer allowed	Switch-off threshold has been reached
120	0	Interrupt limitation fuel meter input	Too many disturbance pulses at the fuel meters input $\rightarrow$ Improve EMC
121	#	Internal error EEPROM access	Make a reset, repeat last parameterization / check. Restore the parameter set, if error occurs re- peatedly, replace the unit
122	#	Internal error EEPROM access	Make a reset, repeat last parameterization / check. Restore the parameter set, if error occurs re- peatedly, replace the unit
123	#	Internal error EEPROM access	Make a reset, repeat last parameterization / check. Restore the parameter set, if error occurs re- peatedly, replace the unit
124	#	Internal error EEPROM access	Make a reset, repeat last parameterization / check. Restore the parameter set, if error occurs re- peatedly, replace the unit
125	#	Internal error EEPROM read access	Make a reset, repeat last parameterization / check. If error occurs repeatedly, replace the unit
126	#	Internal error EEPROM write access	Make a reset, repeat last parameterization / check. If error occurs repeatedly, replace the unit
127	#	Internal error EEPROM access	Make a reset, repeat last parameterization / check. Restore the parameter set, if error occurs re- peatedly, replace the unit
128	0	Internal error EEPROM access - synchronization during initialization	Make a reset; if error occurs repeatedly, replace the unit
129	#	Internal error EEPROM access – command syn- chronization	Make a reset, repeat last parameterization / check. If error occurs repeatedly, replace the unit
130	#	Internal error EEPROM access - timeout	Make a reset, repeat last parameterization / check. If error occurs repeatedly, replace the unit
131	#	Internal error EEPROM access - page on abort	Make a reset, repeat last parameterization / check. If error occurs repeatedly, replace the unit
132	#	Internal error EEPROM register initialization	Make a reset; if error occurs repeatedly, replace the unit
133	#	Internal error EEPROM access – Request synchro- nization	Make a reset, repeat last parameterization / check. If error occurs repeatedly, replace the unit
134	#	Internal error EEPROM access – Request synchro- nization	Make a reset, repeat last parameterization / check. If error occurs repeatedly, replace the unit
135	#	Internal error EEPROM access – Request synchro- nization	Make a reset, repeat last parameterization / check. If error occurs repeatedly, replace the unit
136	1	Restore started	Restore of a backup has been started (no error)

Error	Diagnostic code	Meaning for the LMV2x/3x system	Remedy
137	#	Internal error – backup / restore	
	157 (-99)	Restore – ok, but backup < data set of current system	Restore successful, but backup data record is smaller than in the current system
	239 (-17)	Backup – storage of backup in AZL2 faulty	Reset and repeat backup
	240 (-16)	Restore – no backup in AZL2	No backup stored in AZL2
	241 (-15)	Restore – abortion due to unsuitable product no. (ASN)	Backup has an unsuitable product no. (ASN) and must not be restored
	242 (-14)	Backup – backup made is inconsistent	Backup is faulty and cannot be transferred back
	243 (-13)	Backup – data comparison between µCs faulty	Reset and repeat backup
	244 (-12)	Backup data are incompatible	Backup data are incompatible with the current software version, restore not possible
	245 (-11)	Access error to parameter Restore_Complete	Reset and repeat backup
	246 (-10)	Restore – timeout when storing in EEPROM	Reset and repeat backup
	247 (-9)	Data received are inconsistent	Backup data record invalid, restore not possible
	248 (-8)	Restore cannot at present be made	Reset and repeat backup
	249 (-7)	Restore – abortion due to unsuitable burner identifica- tion	Backup has an unsuitable burner identification and must not be transferred to the unit
	250 (-6)	Backup – CRC of one page is not correct	Backup data record invalid, restore not possible
	251 (-5)	Backup – burner identification is not defined	Define burner identification and repeat backup
	252 (-4)	After restore, pages still on ABORT	Reset and repeat backup
	253 (-3)	Restore cannot at present be made	Reset and repeat backup
	254 (-2)	Abortion due to transmission error	Reset and repeat backup
	255 (-1)	Abortion due to timeout during backup / restore	Make a reset, check the connections and repeat backup / restore
440		Time out huilding outemation interface	Pefer to Medbus Lloss Desumentation (A7541)
140	#	I meour building automation interface	
	7	Modbus timeout	
	2	reserved	

Error	Diagnostic code	Meaning for the LMV2x/3x system	Remedy
150	#	TÜV test	
	1 (-1)	Invalid phase	TÜV test may only be started in phase 60 (operation)
	2 (-2)	TÜV test default output too low	TÜV test default output must not be smaller than the lower output limit
	3 (-3)	TŪV test default output too high	TÜV test default output must not be greater than the upper output limit
	4 (-4)	Manual interruption	No error: Manual abortion of TÜV test by user
	5 (-5)	TÜV test timeout	<ol> <li>No loss of flame after shutdown of fuel valves</li> <li>Check to see if there is extraneous light</li> <li>Check wiring to see if there is a short-circuit</li> <li>Check to see if valve is leaking</li> </ol>
165	#	Internal error	
166	0	Internal error watchdog reset	
167	#	Manual locking	Unit has been manually locked (no error)
	1	Manual locking by contact	
	2	Manual locking by AZL2	
	3	Manual locking by PC tool	
	8	Manual locking by the AZL2 Timeout / communication breakdown	During a curve adjustment via the AZL2, the timeout for menu operation has elapsed (setting via parameter 127), or communication between the LMV26 and the AZL2 has broken down
	9	Manual locking by the PC tool Communication breakdown	During a curve adjustment via the ACS410, communication between the LMV26 and the ACS410 was interrupted for more than 30 seconds
	33	Manual locking by the PC tool Test of lockout	PC tool made a reset attempt with an error-free system
168	#	Internal error management	Make a reset; if error occurs repeatedly, replace the unit
169	#	Internal error management	Make a reset; if error occurs repeatedly, replace the unit
170	#	Internal error management	Make a reset; if error occurs repeatedly, replace the unit
171	#	Internal error management	Make a reset; if error occurs repeatedly, replace the unit
200 OFF	#	System error-free	No error

Error			
code	Diagnostic code	Meaning for the LMV2x/3x system	Remedy
201 OFF UP O or			Start prevention due to unparameterized unit
OFF UP-1	#	Prevention of startup	Go to error history, entry 702, for initial cause of the error with shutdown in connection with the
OFF OFT			first curve settings
	Bit 0	No operating mode selected	
	Valency 1	no operating mode eclected	
	Bit 1	No fuel train defined	
	Valency 23		
	Bit 2 Valency 4 7	No curves defined	
	Bit 3		
	Valency 8. 15	Standardized speed undefined	
	Bit 4		
	Valency 1631	Backup / restore was not possible	
202	#	Internal error operating mode selection	Redefine the operating mode (parameter 201)
202		Internal error	Redefine the operating mode (parameter 201).
203	*	internal error	Make a reset; if error occurs repeatedly, replace the unit
204	Phase number	Program stop	Program stop is active (no error)
205	#	Internal error	Make a reset; if error occurs repeatedly, replace the unit
206	0	Inadmissible combination of units	
200	0	(basic unit – AZL2)	
207	#	Version compatibility basic unit – AZL2	
	0	Basic unit version too old	
	1	AZL2 version too old	
208	#	Internal error	Make a reset; if error occurs repeatedly, replace the unit
209	#	Internal error	Make a reset; if error occurs repeatedly, replace the unit
240	0	Selected operating mode is not released for the basic	Select a released energing mode for the basic unit
210	0	unit	Select a released operating mode for the basic unit
240	#	Internal error	Make a reset; if error occurs repeatedly, replace the unit
245	#	Internal error	Make a reset; if error occurs repeatedly, replace the unit
250	#	Internal error	Make a reset; if error occurs repeatedly, replace the unit

### WIRING DIAGRAM Wiring connection for LMV20





Air actuator

Fuel actuator

# Wiring variants for LMV27

### ConnectorX75



- 2 Fuel meter input
- 1 Supply fuel meter

### ConnectorX5-02



### Wiring variants for LMV26

### ConnectorX08-04 / X09-04



1 - Fuel1

#### ConnectorX75



- 2 Fuel meter input
- 1 Supply fuel meter

#### ConnectorX64



- 5 -Power supply speed sensor
- 4 -Speed sensor input
- 3 PWM (Pulse Width Modulation) speed output
- 2 GND (signal reference)
- 1 -Controller input (4÷20mA)

### ConnectorX74



- 5 -Supply
- 4 -Feedback signal
- 3 PWM (Pulse Width Modulation) speed output
- 2 GND (signal reference)
- 1 -External supply 24V DC

### Wiring variants for LMV37

### ConnectorX75



2 - Fuel meter input

1 - Supply fuel meter

### ConnectorX5-02



### ConnectorX64



### ConnectorX74



- 5 -Power supply speed sensor
- 4 -Speed sensor input
- 3 PWM (Pulse Width Modulation) speed output
- 2 GND (signal reference)
- 1 -Controller input (4÷20mA)
- 5 -Supply
- 4 -Feedback signal
- 3 PWM (Pulse Width Modulation) speed output
- 2 GND (signal reference)
- 1 -External supply 24V DC



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



# **CIB UNIGAS 600V**

CONTROLLER



# **USER'S MANUAL**

COD. M12925CA Rel 1.2 08/2014

SOFTWARE VERSION 1.0x T73 code 80379 / Edition 01 - 06/2012

# **1 · INSTALLATION**

### · Dimensions and cut-out; panel mounting





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#### Panel mounting:

To fix the unit, insert the brackets provided into the seats on either side of the case. To mount two or more units side by side, respect the cut-out dimensions shown in the drawing.

CE MARKING: The instrument conforms to the European Directives 2004/108/CE and 2006/95/CE with reference to the generic standards: EN 61000-6-2 (immunity in industrial environment) EN 61000-6-3 (emission in residential environment) EN 61010-1 (safety).

MAINTENANCE: Repairs must be done only by trained and specialized personnel.

Cut power to the device before accessing internal parts.

Do not clean the case with hydrocarbon-based solvents (Petrol, Trichlorethylene, etc.). Use of these solvents can reduce the mechanical reliability of the device. Use a cloth dampened in ethyl alcohol or water to clean the external plastic case.

SERVICE: GEFRAN has a service department. The warranty excludes defects caused by any use not conforming to these instructions.

#### EMC conformity has been tested with the following connections

FUNCTION	CABLE TYPE	LENGTH
Power supply cable	1 mm ²	1 m
Relay output cable	1 mm ²	3,5 m
TC input	0,8 mm ² compensated	5 m
Pt100 input	1 mm ²	3 m

### 2 · TECHNICAL SPECIFICATIONS

Display	2x4 digit green, high display 10 and 7mm
Keys	4 of mechanical type (Man/Aut, INC, DEC, F)
Accuracy	0.2% f.s. ±1 digit ambient temperature 25°C
Main input (settable digital filter)	TC, RTD, PTC, NTC 60mV,1V Ri≥1MΩ; 5V,10V Ri≥10KΩ; 20mA Ri=50Ω Tempo di campionamento 120 msec.
Type TC Thermocouples (ITS90)	Type TC Thermocouples : J,K,R,S,T (IEC 584-1, CEI EN 60584-1, 60584-2) ; custom linearization is available / types B,E,N,L GOST,U,G,D,C are available by using the custom linearization.
Cold junction error	0,1° / °C
RTD type (scale configurable within indicated range, with or without decimal point) (ITS90)	DIN 43760 (Pt100), JPT100 20Ω
PTC type / NTC Type	9900 25°C / 1KO 25°C
Safety	detection of short-circuit or opening of probes, LBA alarm
°C / °F selection	configurable from faceplate
Linear scale ranges	-1999 to 9999 with configurable decimal point position
Controls	PID, Self-tuning, on-off
pb - dt - it	0,0999,9 % - 0,0099,99 min - 0,0099,99 min
Action	Heat / Cool
Control outputs	on / off
Maximum power limit heat / cool	0,0100,0 %
Cycle time	0200 sec
Main output type	relay, logic, continuous (010V Rload $\ge 250$ K $\Omega$ , 0/420mA Rload $\le 500\Omega$ )
Softstart	0,0500,0 min
Fault power setting	-100,0100,0 %
Automatic blanking	Displays PV value, optional exclusion
Configurable alarms	Up to 3 alarm functions assignable to an output, configurable as: maximum, minimum, symmetrical, absolute/deviation, LBA
Alarm masking	<ul> <li>exclusion during warm up</li> <li>latching reset from faceplate or external contact</li> </ul>
Type of relay contact	NO (NC), 5A, 250V/30Vdc cosφ=1
Logic output for static relays	24V ±10% (10V min at 20mA)
Transmitter power supply	15/24Vdc, max 30mA short-circuit protection
Power supply (switching type)	(std) 100 240Vac ±10% (opt.) 1127Vac/dc ±10%; 50/60Hz, 8VA max
Faceplate protection	IP65
Working / Storage temperature range	050°C / -2070°C
Relative humidity	20 85% non-condensing
Environmental conditions of use	for internal use only, altitude up to 2000m
Installation	Panel, plug-in from front
Weight	160g for the complete version



# **5** • "EASY" PROGRAMMING and CONFIGURATION



#### • Prot



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### 6 • PROGRAMMING and CONFIGURATION



N.B.: Once a particular configuration is entered, all unnecessary parameters are no longer displayed

### InFo Display



• CFG

	CFG	Con	trol para	ameters		
			0.1	Quetinue		0 - 4 - 1
0	54	Enabling	S.tun	autotuning	Sel-ttuning	Softstart
		sen-turning,		VES	NO	NO
		autotuning,	2	NO	YES	NO
		softstart	3	YES	YES	NO
			4	NO	NO	YES
			5	YES	NO	YES
			6	-	-	-
			7	-	-	-
			Stun	Autotuning	Selftuning	Softetart
			0.001	one shot	Genturning	Constan
			8*	WAIT	NO	NO
			9	GO	NO	NO
			10*	WAIT	YES	NO
			11	GO	YES	NO
			12*	WAIT	NO	YES
			13	GO	NO	YES
	(	*) +16 with passa +32 with passa +64 with passa +128 with passa	age auto age auto age auto age auto	omatic rifle in G omatic rifle in C omatic rifle in C omatic rifle in C	GO if PV-SP GO if PV-SP GO if PV-SP GO if PV-SP	> 0,5% > 1% > 2% > 4%
1.2	h.₽Ъ ↓	Proportional heating or hys regulation C	band for teresis i N/OFF	n 0 99	9.9% f.s.	
5.83	h. IE	Integral time fo	or heatin	ng 0.00 s	99.99 min	
1.33	hdł	Derivative ti heatin	ime for g	0.00 9	99.99 min	
		Г				
100.0	ҺҎӾ	Maximum pow heatin	er limit f g	or 0.0	100.0%	
	<b>\</b>			_		
0.0	h.P.L	Minimum pov for heat (not available for o cool action	wer limit ing double he on)	at/	100.0%	
	*					







For custom linearization:

0...60 mV

12...60 mV

12...60 mV

0...20 mA 0...20 mA

4...20 mA

4...20 mA

0...10 V

0...10 V

2...10 V

2...10 V 0...5 V

0...5 V 1...5 V 1...5 V

0...1 V

0...1 V

200mv..1V

200mv..1V Cust10 V-20mA

Cust10 V-20mA

Cust 60mV

Cust 60mV

PT100-JPT

PTC

NTC

39

40

41

42

43

44

45

46

47

48

49

50

51 52

53

54

55

56

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58

59

60

61

62 63

64

- LO signal is generated with variable below Lo.S or at minimum calibration value

Custom scale

-1999/9999

Custom scale

CUSTOM

CUSTOM

CUSTOM

Custom scale

-199.9/999.9

Custom scale

-199.9/999.9 Custom scale

-199.9/999.9

Custom scale

-199.9/999.9

Custom scale

-199.9/999.9

Custom scale

-199.9/999.9

Custom scale -199.9/999.9

Custom scale

-199.9/999.9

Custom scale

-199.9/999.9

Custom scale

-199.9/999.9

Custom scale

-199.9/999.9

Custom scale

CUSTOM

CUSTOM

CUSTOM

- HI signal is generated with variable above Lo.S or at maximum calibration value

• Out



### • Prot

12

#### Pro Protection code Prot Display Modification SP, Hy.P, Hy.n, AL.2, AL.3, PoS, OuP, INF SP, Hy.P , Hy.n, AL.2, AL.3, PoS 0 1 SP, Hy.P, Hy.n, AL.2, AL.3, PoS, OuP, INF SP 2 SP, OuP, INF + 4 to disable InP, Out + 8 to disable CFG + 8 to disable CrG + 16 to disable SW "power-up - power down" + 32 disable manual power latching + 64 to disable manual power modification

+128 enables full configuration

Note: OuP and INF only display configuration extended

### • Hrd





# • Lin



# • U.CAL



### 7 · CONSENT FOR BURNER AL1



Obtain burner consent by configuring alarm 1 as inverse deviation with positive hysteresis Hy.P and negative hysteresis Hy.n

### 8 • PRE-HEATING FUNCTION

Enable the pre-heating function by setting parameters GS.0, Ht.0, GS.1 other than zero.

It consists of three phases that are activated sequentially at firing:

- Ramp 0 phase

Enabled by setting GS.0 > 0. Starting from setpoint = PV (initial state), it reaches pre-heating set SP.0 with gradient GS.0 - Maintenance phase

- Enabled by setting Ht.0 > 0. Maintains pre-heating setpoint SP.0 for time Ht.0
- Ramp 1 phase

Enabled by setting GS.1 > 0. Starting from pre-heating setpoint SP.0, it reaches active _SP set with gradient GS.1

In case of selftuning, the pre-heating function is not activated



### 9 · ADJUSTMENT WITH MOTORIZED VALVE

In an adjustment process the adjustment valve has the function of varying fuel delivery (frequently corresponding to the thermal energy introduced into the process) in relation to the signal coming from the controller.

For this purpose it is provided with an actuator able to modify its opening value, overcoming the resistances produced by the fluid passing inside it.

The adjustment valves vary the delivery in a modulated manner, producing finite variations in the fluid passage inner area corresponding to finite variations of the actuator input signal, coming from the controller. The servomechanism, for example, comprises an electric motor, a reducer and a mechanical transmission system which actions the valve.

Various auxiliary components can be present such as the mechanical and electrical safety end travels, manual actioning systems.



CONTROL EXAMPLE FOR V0 VALVE

The controller determines, on the basis of the dynamics of the process, the control output for the valve corresponding to the opening of the same in such a way so as to maintain the desired value of the process variable.

#### Characteristic parameters for valves control

- Actuator time (Ac.t) is the time employed by the valve to pass from entirely open to entirely closed (or vice-versa), and can be set with a resolution of one second. It is a mechanical feature of the valve+actuator unit.

NOTE: if the actuator's travel is mechanically limited it is necessary to proportionally reduce the Ac.t value.

- Minimum impulse (t.Lo) expressed as a % of the actuator time (resolution 0.1%).

Represents the minimum change in position corresponding to a minimum change in power supplied by the instrument below which the actuator will not physically respond to the command.

This represents the minimum variation in position due to which the actuator does not physically respond to the command.

The minimum duration of the movement can be set in t.Lo, expressed as a % of actuator time.

- Impulsive intervention threshold (t.Hi) expressed as a % of the actuator time (resolution 0.1%) represents the position displacement (requested position – real position) due to which the manoeuvre request becomes impulsive.

You can choose between 2 types of control:

1) ON time of movement = t.on and OFF time proportional to shift and greater than or equal to t.Lo (we recommend setting t.on = t.Lo) (set t.oF = 0).

2) ON time of movement = t.on and OFF time = t.oF. A value set for t.oF < t.on is forced to t.on. To activate this type, set t.oF <> 0.

The type of movement approach allows fine control of the reverse drive valve (from potentiometer or not), especially useful in cases of high mechanical inertia. Set t.Hi = 0 to exclude modulation in positioning.

This type of modulated approach allows precise control of the feedback actioned valve, by a potentiometer or not, and is especially useful in cases of high mechanical inertia. Setting t.Hi = 0 excludes modulation in positioning.

- Dead zone(dE.b) is a displacement band between the adjustment setpoint and the process variable within which the controller does not supply any command to the valve (Open = OFF; Close = OFF). It is expressed as a percentage of the bottom scale and is positioned below the setpoint. The dead zone is useful in an operative process to avoid straining the actuator with repeated commands and an insignificant effect on the adjustment. Setting dE.b = 0 the dead zone is excluded.



Graph of behavior inside the band with integral time  $\neq 0$ .

With integral time = 0, movement ON time is always equal to OFF time.

t0 = t.Lo

### Valve control modes

With the controller in manual, the setting of parameter At.y ≥ 8 allows direct control of the valve open and close commands through the keyboard Increments and Decrements on the front seats.

#### V0 - for floating valve without potentiometer

Model V0 have similar behaviour: every manoeuvre request greater than the minimum impulse t.Lo is sent to the actuator by means of the OPEN/CLOSE relays; every action updates the presumed position of the virtual potentiometer calculated on the basis of the actuator travel declared time. In this way there is always a presumed position of the valve which is compared with the position request of the controller.

Having reached a presumed extreme position (entirely open or entirely closed determined by the "virtual potentiometer") the controller provides a command in the same direction, in this way ensuring the real extreme position is reached (minimum command time = t.on).

The actuators are usually protected against the OPEN command in the entirely open position or CLOSE command in the entirely closed position.

#### V3 - for floating valve, PI control

When the difference between the position calculated by the controller and the only proportional component exceeds the value corresponding to the minimum impulse t.Lo the controller provides an OPEN or CLOSE command of the duration of the minimum impulse itself t.Lo. At each delivery the integral component of the command is set to zero (discharge of the integral).

The frequency and duration of the impulses is correlated to the integral time (h.it or c.it).

#### Non-movement behavior

t.Hi = 0: with power = 100% or 0.0%, the corresponding open or close outputs always remain enabled (safety status).

#### Movement behavior

t.Hi <> 0: with position attained corresponding to 100% or 0.0%, the corresponding open or close outputs are switched off.



If t.oF = 0, current function is maintained.

If t.oF  $\neq$  0 movement mode will be as shown on the graph

### **10 · CONTROL ACTIONS**

Proportional Action:

action in which contribution to output is proportional to deviation at input (deviation = difference between controlled variable and setpoint). *Derivative Action*:

action in which contribution to output is proportional to rate of variation input deviation. Integral Action:

Integral Action.

action in which contribution to output is proportional to integral of time of input deviation.

#### Influence of Proportional, Derivative and Integral actions on response of process under control

* An increase in P.B. reduces oscillations but increases deviation.

* A reduction in P.B. reduces the deviation but provokes oscillations of the controlled variable (the system tends to be unstable if P.B. value is too low).

* An increase in Derivative Action corresponds to an increase in Derivative Time, reduces deviation and prevents oscillation up to a critical value of Derivative Time, beyond which deviation increases and prolonged oscillations occur.

* An increase in Integral Action corresponds to a reduction in Integral Time, and tends to eliminate deviation between the controlled variable and the setpoint when the system is running at rated speed.

If the Integral Time value is too long (Weak integral action), deviation between the controlled variable and the setpoint may persist.

Contact GEFRAN for more information on control actions.

# 11 • MANUAL TUNING

#### A) Enter the setpoint at its working value.

B) Set the proportional band at 0.1% (with on-off type setting).

C) Switch to automatic and observe the behavior of the variable. It will be similar to that in the figure:



D) The PID parameters are calculated s follows: Proportional band

#### Peak P.B.= ----- x 100 (V max - V min)

(V max - V min) is the scale range.

Integral time: It = 1.5 x T

Derivative time: dt = It/4

E) Switch the unit to manual, set the calculated parameters. Return to PID action by setting the appropriate relay output cycle time, and switch back to Automatic. F) If possible, to optimize parameters, change the setpoint and check temporary response. If an oscillation persists, increase the proportional band. If the response is too slow, reduce it.

# 12 · SET GRADIENT

SET GRADIENT: if set to ≠0, the setpoint is assumed equal to PV at power-on and auto/man switchover. With gradient set, it reaches the local setpoint. Every variation in setpoint is subject to a gradient.

The set gradient is inhibited at power-on when self-tuning is engaged.

If the set gradient is set to  $\neq 0$ , it is active even with variations of the local setpoint.

The control setpoint reaches the set value at the speed defined by the gradient.

# 13 · SOFTWARE ON / OFF SWITCHING FUNCTION

How to switch the unit OFF: hold down the "F" and "Raise" keys simultaneously for 5 seconds to deactivate the unit, which will go to the OFF state while keeping the line supply connected and keeping the process value displayed. The SV display is OFF.

All outputs (alarms and controls) are OFF (logic level 0, relays de-energized) and all unit functions are disabled except the switch-on function and digital communication.

How to switch the unit ON: hold down the "F" key for 5 seconds and the unit will switch OFF to ON. If there is a power failure during the OFF state, the unit will remain in OFF state at the next power-up (ON/OFF state is memorized).

The function is normally enabled, but can be disabled by setting the parameter Prot = Prot +16.

# 14 · SELF-TUNING

The function works for single output systems (heating or cooling). The self-tuning action calculates optimum control parameter values during process startup. The variable (for example, temperature) must be that assumed at zero power (room temperature).

The controller supplies maximum power until an intermediate value between starting value and setpoint is reached, after which it zeros power.

PID parameters are calculated by measuring overshoot and the time needed to reach peak. When calculations are finished, the system disables automatically and the control proceeds until the setpoint is reached.

#### How to activate self-tuning:

- A. Activation at power-on
- 1. Set the setpoint to the required value
- 2. Enable selftuning by setting the Stun parameter to 2 (CFG menu)
- 3. Turn off the instrument
- 4. Make sure the temperature is near room temperature
- 5. Turn on the instrument again
- B. Activation from keyboard
- 1. Make sure that key M/A is enabled for Start/Stop selftuning (code but = 6 Hrd menu)
- 2. Bring the temperature near room temperature
- 3. Set the setpoint to the required value
- 4. Press key M/A to activate selftuning (Attention: selftuning interrupts if the key is pressed again)

The procedure runs automatically until finished, when the new PID parameters are stored: proportional band, integral and derivative times calculated for the active action (heating or cooling). In case of double action (heating or cooling), parameters for the opposite action are calculated by maintaining the initial ratio between parameters (ex.: CPb = HPb * K; where K = CPb / HPb when self-tuning starts). When finished, the Stun code is automatically cancelled.

#### Notes :

-The procedure does not start if the temperature is higher than the setpoint (heating control mode) or if the temperature is lower than the setpoint (cooling control mode). In this case, the Stu code is not cancelled.

-It is advisable to eneable one of the configurable LEDs to signal selftuning status.By setting one of parameters

LED1, LED2, LED3=4 or 20 on the Hrd menu, the respective LED will be on or flashing when selftuning is active.



# 15 · ACCESSORIES

### Interface for instrument configuration





### WARNINGS

WARNING: this symbol indicates danger. It is placed near the power supply circuit and near high-voltage relay contacts.

Read the following warnings before installing, connecting or using the device:

· follow instructions precisely when connecting the device.

· always use cables that are suitable for the voltage and current levels indicated in the technical specifications.

• the device has no ON/OFF switch: it switches on immediately when power is turned on. For safety reasons, devices permanently connected to the power supply require a twophase disconnecting switch with proper marking. Such switch must be located near the device and must be easily reachable by the user. A single switch can control several units.

• if the device is connected to electrically NON-ISOLATED equipment (e.g. thermocouples), a grounding wire must be applied to assure that this connection is not made directly through the machine structure.

• if the device is used in applications where there is risk of injury to persons and/or damage to machines or materials, it MUST be used with auxiliary alarm units. You should be able to check the correct operation of such units during normal operation of the device.

• before using the device, the user must check that all device parameters are correctly set in order to avoid injury to persons and/or damage to property.

• the device must NOT be used in infiammable or explosive environments. It may be connected to units operating in such environments only by means of suitable interfaces in conformity to local safety regulations.

• the device contains components that are sensitive to static electrical discharges. Therefore, take appropriate precautions when handling electronic circuit boards in order to prevent permanent damage to these components.

Installation: installation category II, pollution level 2, double isolation

The equipment is intended for permanent indoor installations within their own enclosure or panel mounted enclosing the rear housing and exposed terminals on the back.

• only for low power supply: supply from Class 2 or low voltage limited energy source

• power supply lines must be separated from device input and output lines; always check that the supply voltage matches the voltage indicated on the device label.

• install the instrumentation separately from the relays and power switching devices

• do not install high-power remote switches, contactors, relays, thyristor power units (particularly if "phase angle" type), motors, etc... in the same cabinet.

· avoid dust, humidity, corrosive gases and heat sources.

· do not close the ventilation holes; working temperature must be in the range of 0...50°C.

surrounding air: 50°C

• use 60/75°C copper (Cu) conductor only, wire size range 2x No 22 - 14AWG, Solid/Stranded

• use terminal tightening torque 0.5N m

If the device has faston terminals, they must be protected and isolated; if the device has screw terminals, wires should be attached at least in pairs.

• Power: supplied from a disconnecting switch with fuse for the device section; path of wires from switch to devices should be as straight as possible; the same supply should not be used to power relays, contactors, solenoid valves, etc.; if the voltage waveform is strongly distorted by thyristor switching units or by electric motors, it is recommended that an isolation transformer be used only for the devices, connecting the screen to ground; it is important for the electrical system to have a good ground connection; voltage between neutral and ground must not exceed 1V and resistance must be less than 60hm; if the supply voltage is highly variable, use a voltage stabilizer for the device; use line filters in the vicinity of high frequency generators or arc welders; power supply lines must be separated from device input and output lines; always check that the supply voltage matches the voltage indicated on the device label.

• Input and output connections: external connected circuits must have double insulation; to connect analog inputs (TC, RTD) you have to: physically separate input wiring from power supply wiring, from output wiring, and from power connections; use twisted and screened cables, with screen connected to ground at only one point; to connect adjustment and alarm outputs (contactors, solenoid valves, motors, fans, etc.), install RC groups (resistor and capacitor in series) in parallel with inductive loads that work in AC (*Note: all capacitors must conform to VDE standards (class x2) and support at least 220 VAC. Resistors must be at least 2W*); fit a 1N4007 diode in parallel with the coil of inductive loads that operate in DC.

GEFRAN spa will not be held liable for any injury to persons and/or damage to property deriving from tampering, from any incorrect or erroneous use, or from any use not conforming to the device specifications.

### Set-up for 600V RRR0-1-T73 regulator

### Set up for temperature probe Pt100 (ex Siemens QAE2120 130°C max.)

# The regulator comes out of the factory preset with the corresponding values of the Siemens RWF40.000 and RWF50.2x

### Verify wiring of the sensor



Regulation of the set-point = 80It can be modified by using arrows "up" and "down". By pushing **F** you go to parameters:

Hy.P	5 (hysteresis positive for output 1, terminals 21-22 (ex Q13-Q14)
Hy.n	-5 hysteresis negative for output ,1 terminals 21-22 (ex Q13-Q14)

Keep pushing F until you see PASS, release F and through the arrows set 99, push F and visualize Pro (protection code) default is 12, through the arrows set 128 and push F, keep it pushed until all parameters InF, CFG, InP, Out, PASS are visualized.

CFG	
S.tun	0
hPb	1,2
hlt	5,83
hdt	1,33

InP	
tyP	30 (Pt100)
dP_S	1 (decimals num.)
Lo.S	0 (min. sensor scale)
Hi.S	850,0 (max sensor scale)
oFS	0 (offset of input correction)
Lo.L	30,0 (lower set-point range limit)
Hi.L	130,0 (upper set-point range limit)

Out	
A1.r	0
A1.t	3 (operating mode AL1 =inverse-relative-normal)
rL.1	2 (AL1)
rL.2	18 (open)
rL.3	19 (close)
rEL	0
A.ty	9 (type of servocontrol command)
Ac.t	12 (servocontrol running time: SQN72.4/STA12=12;
	SQM40.265=30)
t_Lo	2
t_Hi	0.0
t.on	2
t.oF	0.0
dE.b	0,1 (dead zone in % of end scale)

PAS	99 then push and keep pushed <b>F</b> until visualization of <b>Hrd</b>
Hrd	
CtrL	6 (PID warm)
AL.nr	1
but	1
diSP	0
Ld.1	1
Ld.2	28
Ld.3	20

Keep pushed F until you visualize **PASS**, release F and through the arrows set **99**, push F and visualize **Pro** (protection code) from **128**, through the arrows, bring it back to **12**, and keep F pushed until you come back to set-point value.

### Manual operation :

Keep pushed the lower left key for at least 5 sec.

The instrument will enter the "MAN" mode (see also "Ld1" switching on).

Through the arrows, "Open" and "Close" outputs are activated.

To come back to normal working keep the lower left key pushed for at least 5 sec.

### Software switch off :

By keeping pushed keys **Arrow up** + **F** for more than 5 sec. the instrument switches off the software, does not command the outputs and visualize only the variable of process measured by the probe. To restore keep pushed **F** for more than 5 sec.

### Set up for temperature probe Pt100 for high temperature (350°C max.)

### Verify wiring of the sensor



### Regulation of the set-point = 80

It can be modified by using arrows "up" and "down".

By pushing <b>F</b> you go to parameters:	
Hy.P	10 (hysteresis positive for output 1 terminals 21-22 (ex Q13-Q14)
Hy.n	-5 (hysteresis negative for output 1 terminals 21-22 (ex Q13-Q14)

Keep pushing F until you see PASS, release F and through the arrows set 99, push F and visualize Pro (protection code) default is 12, through the arrows set 128 and push F, keep it pushed until all parameters InF, CFG, InP, Out, PASS are visualized.

CFG	
S.tun	0
hPb	1,2
hlt	5,83
hdt	1,33

InP	
tyP	30 (Pt100)
dP_S	1 (decimals num.)
Lo.S	0 (min. sensor scale)
Hi.S	850,0 (max sensor scale)
oFS	0 (offset of input correction)
Lo.L	0,0 (lower set-point range limit)
Hi.L	350,0 (upper set-point range limit)

Out	
A1.r	0
A1.t	3 (mode AL1 =inverse-relative-normal)
rL.1	2 (AL1)
rL.2	18 (open)
rL.3	19 (close)
rEL	0
A.ty	9 (type of servocontrol command)
Ac.t	12 (servocontrol running time: SQN72.4/STA12=12; SQM40.265=30)
t_Lo	2
t_Hi	0.0
t.on	2
t.oF	0.0
dE.b	0,1 (dead zone in % of end scale)

PAS	99 then push and keep pushed <b>F</b> until visualization of <b>Hrd</b>
Hrd	
CtrL	6 (PID warm)
AL.nr	1
but	1
diSP	0
Ld.1	1
Ld.2	28
Ld.3	20

Keep pushed F until you visualize PASS, release F and through the arrows set 99, push F and visualize Pro (protection code) from 128, through the arrows, bring it back to 12, and keep F pushed until you come back to set-point value.

### Manual operation:

Keep pushed the lower left key for at least 5 sec.

The instrument will enter the "MAN" mode (see also "Ld1" switching on). Through the arrows, "Open" and "Close" outputs are activated.

To come back to normal working keep the lower left key pushed for at least 5 sec.

### Software switch off :

By keeping pushed keys Arrow up + F for more than 5 sec. the instrument switches off the software, does not command the outputs and visualize only the variable of process measured by the probe. To restore keep pushed **F** for more than 5 sec.

### Set up for pressure transmitter 2 wires signal 4+20mA



With pressure transmitters first we need to enable their power supply: remove the part as shown below, then, on the CPU unit, move the bridge from Pt100 to +Vt



### Verify wiring of the sensor

#### Impostazione set-point

Transmitter	1,6bar	3bar	10bar	16bar	25bar	40bar
Set-point	1bar	1,5bar	6bar	6bar	6bar	6bar

To modify it directly use "up" and "down" arrows.

By pushing <b>F</b> you go to parameter.						
Transmitter	1,6bar	3bar	10bar	16bar	25bar	40bar
Hy.P	0,2bar	0,5bar	0,5bar	0,8bar	1,25bar	2bar
Hy.n	0bar	0bar	0bar	0bar	0bar	0bar

Keep pushing **F** until you see **PASS**, release **F** and through the arrows set **99**, push **F** and visualize **Pro** (protection code) default is **12**, through the arrows set **128** and push **F**, keep it pushed until all parameters **InF**, **CFG**, **InP**, **Out**, **PASS** are visualized.

CFG	
S.tun	0
hPb	5
hlt	1,33
hdt	0,33

InP				
tyP	44 (4÷20mA)			
dP_S	2 (decimals num.)			

Transmitter	1,6bar	3bar	10bar	16bar	25bar	40bar		
Lo.S	0,00	0,00	0,00	0,00	0,00	0,00	min. sensor scale	
Hi.S	1,60	3,00	10,00	16,00	25,00	40,00	max sensor scale	
oFS	0	0	0	0	0	0	offset of input correction	
Lo.L	0,00	0,00	0,00	0,00	0,00	0,00	lower set-point setting	
Hi.L	1,60	3,00	10,00	16,00	25,00	40,00	upper set-point setting	

Out	
A1.r	0
A1.t	3 (mode AL1 =inverse-relative-normal)
rL.1	2 (AL1)
rL.2	18 (open)
rL.3	19 (close)
rEL	0
A.ty	9 (type of servocontrol command)
Ac.t	12 (servocontrol running time: SQN72.4/STA12=12; SQM40.265=30)
t_Lo	2
t_Hi	0.0
t.on	2
t.oF	0.0
dE.b	0,1 (dead zone in % of end scale)

PAS	99 then push and keep pushed <b>F</b> until visualization of <b>Hrd</b>
Hrd	
CtrL	6 (PID warm)
AL.nr	1
but	1
diSP	0
Ld.1	1
Ld.2	28
Ld.3	20

Keep pushed F until you visualize **PASS**, release F and through the arrows set **99**, push F and visualize **Pro** (protection code) from **128**, through the arrows, bring it back to **12**, and keep F pushed until you come back to set-point value.

### Manual operation:

Keep pushed the lower left key for at least 5 sec.

The instrument will enter the "MAN" mode (see also "Ld1" switching on).

Through the arrows, "Open" and "Close" outputs are activated.

To come back to normal working keep the lower left key pushed for at least 5 sec.

### Software switch off :

By keeping pushed keys **Arrow up** + **F** for more than 5 sec. the instrument switches off the software, does not command the outputs and visualize only the variable of process measured by the probe. To restore keep pushed **F** for more than 5 sec.

### Verify wiring of the sensor



# Regulation of the set-point = **80**

It can be modified by using arrows "up" and "down".

by pushing <b>r</b> you go to parameters.	
Hy.P	10 (hysteresis positive for output 1 terminals 21-22 (ex Q13-Q14)
Hy.n	-5 (hysteresis negative for output 1 terminals 21-22 (ex Q13-Q14)

Keep pushing F until you see **PASS**, release F and through the arrows set **99**, push F and visualize **Pro** (protection code) default is **12**, through the arrows set **128** and push F, keep it pushed until all parameters **InF**, **CFG**, **InP**, **Out**, **PASS** are visualized.

CFG	
S.tun	0
hPb	1,2
hlt	5,83
hdt	1,33

InP	
tyP	2 (thermocouple <b>K</b> 0÷1300°C) / 0 (thermocouple <b>J</b> 0÷1000°C)
dP_S	0 (no decimal) / 1 (1 decimal)
Lo.S	0 (min. sensor scale)
Hi.S	1300 (max sensor scale for tc K) / 1000 (max sensor scale for tc J)
oFS	0 (offset of input correction)
Lo.L	0 (lower set-point range limit)
Hi.L	1300 (upper set-point range limit) per tc $K$ / 1000 for tc $J$

Out	
A1.r	0
A1.t	3 (mode AL1 =inverse-relative-normal)
rL.1	2 (AL1)
rL.2	18 (open)
rL.3	19 (close)
rEL	0
A.ty	9 (type of servocontrol command)
Ac.t	12 (servocontrol running time: SQN72.4/STA12=12; SQM40.265=30)
t_Lo	2
t_Hi	0.0
t.on	2
t.oF	0.0
dE.b	0,1 (dead zone in % of end scale)

PAS	99 then push and keep pushed <b>F</b> until visualization of <b>Hrd</b>	
Hrd		
CtrL	6 (PID warm)	
AL.nr	1	
but	1	
diSP	0	
Ld.1	1	
Ld.2	28	
Ld.3	20	

Keep pushed F until you visualize **PASS**, release F and through the arrows set **99**, push F and visualize **Pro** (protection code) from **128**, through the arrows, bring it back to **12**, and keep F pushed until you come back to set-point value.

### Manual operation:

Keep pushed the lower left key for at least 5 sec. The instrument will enter the "MAN" mode (see also "Ld1" switching on). Through the arrows, "Open" and "Close" outputs are activated. To come back to normal working keep the lower left key pushed for at least 5 sec.

### Software switch off :

By keeping pushed keys **Arrow up** + **F** for more than 5 sec. the instrument switches off the software, does not command the outputs and visualize only the variable of process measured by the probe. To restore keep pushed **F** for more than 5 sec.
# RWF50.2x & RWF50.3x



User manual

M12922CB Rel.1.0 07/2012

**DEVICE INSTALLATION** Install the device using the relevant tools as shown in the figure. To wire the device and sensors, follow the instructions on the burner wiring diagram.





## FRONT PANEL



NAVIGATION MENU



RWF5 is preset good for 90% of applications. However, you can set or edit parameters as follow:

### Set-point: set or modification:

When the burner is in stand-by, (safety loop open, that is terminals 3-4/T1-T2 on the 7 pole plug open) push the **Enter** button: on the lower display (green) **Opr** appears; push **Enter** again and in the same display **SP1** appears. Push **Enter** again and the lower display (green **SP1**) flashes. Using the **up and down arrows** change the set-point on the upper display (red).Push **Enter** to confirm and push **ESC** more times to get the home position.

### PID parameters set and modifications (see table below):

- Push Enter button, on the green display **Opr** appears; using the **down arrow**, scroll until group **PArA** is reached and push Enter.
- on the green display Pb1 e appears and on the red one the set parameter.
- Push is sequence the down or up arrow the menu is scrolled.
- Push Enter to select and the arrows to choose the desired value. Enter to confirm.

Parameter	Display	Range	Factory setting	Remarks
Proportional band	PB.1	1 9999 digit	10	Typical value for temperature
Derivative action	dt	0 9999 sec.	80	Typical value for temperature
Integral action	rt	0 9999 sec.	350	Typical value for temperature
Dead band (*)	db	0 999,9 digit	1	Typical value
Servocontrol running time	tt	10 3000 sec.	15	Set servocontrol running time
Switch-on differential (*)	HYS1	0,01999 digit	-5	Value under setpoint below which the burner switches back on (1N-1P closes)
Switch-off differential 2° stage (*)	HYS2	0,0 HYS3	3	(enable only with parameter <b>bin1</b> = 4)
Upper switch-off differential (*)	HYS3	0,0… 9999 digit	5	Value over setpoint above which the burner switches off (1N-1P opens)
Switch-on differential on cooling controller (*)	HYS4	0,0… 9999 digit	5	Do not used (enable only with parameter <b>CACt</b> = 0)
Switch-off differential 2° stage on cooling controller (*)	HYS5	HYS6…0,0 digit	5	Do not used (enable only with parameters <b>CACt</b> = 0 and <b>bin1</b> = 4)
Upper switch-off differential on cooling controller (*)	HYS6	0,01999 digit	5	Do not used (enable only with parameter <b>CACt</b> = 0)
Delay modulation	q	0,0 999,9 digit	0	Do not alter

(*)Parameters affected by setting of decimal place (**ConF > dISP** parameter **dECP**)

### Setting the kind of sensor to be connected to the device:

- push the Enter button: on the lower display (green) **Opr** appears. Using the **up and down arrows** find **ConF.** Push Enter to confirm.
- Now on the green display the group InP appears. Push Enter and InP1 is displaied. Enter to confirm.
- You are inside InP1; the green display shows Sen1 (sensor type), while the red display shows the chosen sensor code
- Push Enter to enter the Sen1 parameter, then choose the desired sensor using the arrows. Push Enter to confirm and ESC to escape.
- Once selected the sensor, you can modify all the other parameters using **up and down arrows** according to the tables here below.

Parameter	Value	Description
SEn1	1	Pt100 3 fili
type of sensor for	2	Pt100 2 fili
analog input 1	3	Pt1000 3 fili
	4	Pt1000 2 fili
	5	Ni1000 3 fili
	6	Ni1000 2 fili
	7	0 ÷ 135 ohm
	15	0 ÷ 20mA
	16	4 ÷ 20mA
	17	0 ÷ 10V
	18	0 ÷ 5V
	19	1 ÷ 5V
OFF1		Using the measured value correction (offset), a measured
sensor offset	-1999 <b>0</b> +9999	value can be corrected to a certain degree, either up or down
SCL1		In the case of a measuring transducer with standard signal, the
scale low level		physical signal is assigned a display value here
	-1999 <b>0</b> +9999	(for input ohm, mA, V)
SCH1		In the case of a measuring transducer with standard signal, the
scale high level		physical signal is assigned a display value here
	-1999 <b>100</b> +9999	(for input ohm, mA, V)
dF1		Is used to adapt the digital 2nd order input filter
digital filter	0 <b>0,6</b> 100	(time in s; $0 \text{ s} = \text{filter off}$ )
Unit	1	1 = degrees Celsius
temperature unit	2	2 = degrees Fahrenheit

### ConF > InP >InP1

(**bold** = factory settings)

### Remark:

RWF50.2 e RWF50.3 cannot be connected to thermocouples.

If thermocouples have to be connected, convert the signal to a 4-20 mA one and set the RWF accordingly.

# ConF > Cntr

Parameter	Value	Description
CtYP	1	1 = 3-position controller (open-stop-close only RWF50.2)
controller type	2	2 = continuative action controller (only RWF50.3)
CACt	1	1 = heating controller
control action	0	0 = cooling controller
SPL		
least value of the		set-point limitation prevents entry of values outside the defined
set-point range	-1999 <b>0</b> +9999	range
SPH		
maximum value of the		set-point limitation prevents entry of values outside the defined
set-point range	-1999 <b>100</b> +9999	range
oLLo		
set-point limitation		
start, operation limit		
low	<b>-1999</b> +9999	lower working range limit
oLHi		
set-point limitation		
end, operation limit		
high	-1999 <b>+9999</b>	upper working range limit

(**bold** = factory settings)

# ConF > rAFC

Activation boiler shocl	c termic protetion:						
RWF50 can activate the thermal shock protection only on sites where the set-point is lower than 250°C and according							
to rAL parameter.							
Parameter	Value	Description					
FnCT		Choose type of range degrees/time					
function	0	0 = deactivated					
	1	1 = Kelvin degrees/minute					
	2	2 = Kelvin degrees/hour					
rASL		Slope of thermal shock protection (only with functions 1 and 2)					
ramp rate	<b>0,0</b> 999,9						
toLP tolerance band ramp	<b>0</b> 9999	width of tolerance band (in K) about the set-point <b>0 = tolerance band inactive</b> 40 40 TREASTOR					
rAL ramp limit	<b>0</b> 250	Ramp limit. When this value is lower than the temperature set- point, the RWF controls the output increasing the temp set point step by step according to rASL. If this is over the temp set point, the control is performed in cooling.					

(**bold** = factory settings)

# ConF > OutP (parameter under group only for RWF50.3)

Parameter	Value	Description
FnCt		1 = analog input 1 doubling with possibility to convert
tipo di controllo	1	(depending on par SiGn)
	4	4 = modulation controller
SiGn		physical output signal (terminals A+, A-)
type of output signal	0	0 = 0÷20mA
	1	1 = 4÷20mA
	2	2 = 0÷10V
rOut		
Value when out of		
input range	<b>0</b> 101	signal (in percent) when measurement range is crossed
oPnt		value range of the output variable is assigned to a physical
zero point		output signal Per default, the setting corresponds to 0100%
		angular positioning for the controller outputs (terminals A+, A-)
	-1999 <b>0</b> +9999	(effective only with <b>FnCt</b> = 1)
End		value range of the output variable is assigned to a physical
End value		output signal Per default, the setting corresponds to 0100%
		angular positioning for the controller outputs (terminals A+, A-)
	-1999 <b>100</b> +9999	(effective only with <b>FnCt</b> = 1)

(**bold** = factory settings)

# ConF > binF

Parameter	Value	Description
bin1		0 = without function
digital inputs		1 = set-point changeover (SP1 / SP2)
(terminals DG - D1)		2 = set-point shift ( <b>Opr</b> > <b>dSP</b> parameter = value of set-point
	0	modify)
	1	4 = changeover of operating mode
	2	open – modulating operation;
	4	close – 2 stage operation.

(**bold** = factory settings)

# ConF > dISP

Parameter	Value	Description
diSU		display value for upper display:
upper display	0	0 = display power-off
(red)	1	1 = analog input value
	4	4 = Controller's angular positioning
	6	6 = set-point value
	7	7 = end value with thermal shock protection
diSL		display value for lower display:
lower display	0	0 = display power-off
(green)	1	1 = analog input value
	4	4 = Controller's angular positioning
	6	6 = set-point value
	7	7 = end value with thermal shock protection
tout		time (s) on completion of which the controller returns
timeout	0 <b>180</b> 250	automatically to the basic display, if no button is pressed
dECP	0	0 = no decimal place
decimal point	1	1 = one decimal place
	2	2 = two decimal places
CodE	0	0 = no lockout
level lockout	1	1 = configuration level lockout (ConF)
	2	2 = Parameter and configuration level lockout (PArA & ConF)
	3	3 = keyboard lockout

(**bold** = factory settings)

### Manual control :

- in order to manual change the burner load, while firing keep pushing the **ESC** button for more than 5 s; on the lower green display **Hand** appears.
- using the UP and DOWN arrows, the load varies.
- Keep pushing the ESC button for getting the normal operation again.
- NB: every ime the device shuts the burner down (start led switched off contact 1N-1P open), the manual control is not active.

### Device self-setting (auto-tuning):

If the burner in the steady state does not respond properly to heat generator requests, you can activate the Device's self-setting function, which recalculates PID values for its operation, deciding which are most suitable for the specific kind of request



### Display of software version :



The software version is shown by pushing **Enter + UP arrow** on the upper display

### **Electric connection :**



### Matches terminals between RWF50.2 and RWF40.0x0

ка o Ø	K2 Ø	КЗ	1N Ø	SIE 1P Ø	MENS L1 Ø	RWF ∾	50.2		G- Ø	G+	13 Ø	12 Ø	11 Ø
o Q	Y1	Y2	Q 13	SIEM Q14 Ø	IENS   L1 Ø	RWF4 Ø	0.0x0 Te	U1	G- Ø	G+	M1	l1 ∅	G1+

Parameters summarising for RWF50.2x:

	Conf				Conf										
Navigation menù	Inp													0	
Types of probe	SEn1	OFF1	SCL1	SCH1	Unit	SPL	ntr SPH	dISP	Pb. 1	dt	rt	۲ tt	ArA HYS1 (*)	HYS3 (*)	Opr SP1 (*)
Siemens QAE2120	6	0	needless	needless	1	30	95	1	10	80	350	(#)	-5	5	80 °C
Siemens QAM2120	6	0	needless	needless	1	0	80	1	10	80	350	(#)	-2,5	2,5	40°C
Pt1000 (130°C max.)	4	0	needless	needless	1	30	95	1	10	80	350	(#)	-5	5	80°C
Pt1000 (350°C max.)	4	0	needless	needless	1	0	350	1	10	80	350	(#)	-5	10	80°C
Pt100 (130°C max.)	1	0	needless	needless	1	0	95	1	10	80	350	(#)	-5	5	80°C
Pt100 (350°C max)	1	0	needless	needless	1	0	350	1	10	80	350	(#)	-5	10	80°C
Probe 4÷20mA / 0÷1,6bar	16	0	0	160	needless	0	160	0	5	20	80	(#)	0	20	100 kPa
Probe 4+20mA / 0+3bar	16	0	0	300	needless	0	300	0	5	20	80	(#)	0	20	200 kPa
Probe 4÷20mA / 0÷10bar	16	0	0	1000	needless	0	1000	0	5	20	80	(#)	0	50	600 kPa
Probe 4÷20mA / 0÷16bar	16	0	0	1600	needless	0	1600	0	5	20	80	(#)	0	80	600 kPa
Probe 4÷20mA / 0÷25bar	16	0	0	2500	needless	0	2500	0	5	20	80	(#)	0	125	600 kPa
Probe 4÷20mA / 0÷40bar	16	0	0	4000	needless	0	4000	0	5	20	80	(#)	0	200	600 kPa
Siemens QBE2002 P4	17	0	0	400	needless	0	400	0	5	20	80	(#)	0	20	200 kPa
Siemens QBE2002 P10	17	0	0	1000	needless	0	1000	0	5	20	80	(#)	0	50	600 kPa
Siemens QBE2002 P16	17	0	0	1600	needless	0	1600	0	5	20	80	(#)	0	80	600 kPa
Siemens QBE2002 P25	17	0	0	2500	needless	0	2500	0	5	20	80	(#)	0	125	600 kPa
Siemens QBE2002 P40	17	0	0	4000	needless	0	4000	0	5	20	80	(#)	0	200	600 kPa
Segnale 0÷10V	17	0	to be fixed	to be fixed	needless	to be fixed	to be fixed	to be fixed	5	20	80	(#)	to be fixed	to be fixed	to be fixed
Segnale 4÷20mA	16	0	to be fixed	to be fixed	needless	to be fixed	to be fixed	to be fixed	5	20	80	(#)	to be fixed	to be fixed	to be fixed

NOTE :

(#) tt – servo control run time

(#) the serve control run time SQL33 ; STM30; SQM10; SQM40; SQM50; SQM54 = **30** (secondi) - STA12B3.41; SQN30.251; SQN72.4A4A20 = **12** (secondi) (*) These values are factory set - values <u>must be</u> set during operation at the plant based on the real working temperature/pressure value. WARNING : With pressure probes the parameters SP1, SCH, SCL, HYS1, HYS3 must be selected, and visualized in kPa (kilo Pascal). (<u>1bar = 100.000Pa = 100kPa</u>)

### **APPENDIX: PROBES CONNECTION**

To assure the utmost comfort, the control system needs reliable information, which can be obtained provided the sensors have been installed correctly. Sensors measure and transmit all variations encountered at their location.

Measurement is taken based on design features (time constant) and according to specific operating conditions. With wiring run in raceways, the sheath (or pipe) containing the wires must be plugged at the sensor's terminal board so that currents of air cannot affect the sensor's measurements.

### Ambient probes (or ambient thermostats)

### Installation

The sensors (or room thermostats) must be located in

reference rooms in a position where they can take real temperature measurements without being affected by foreign factors.

ioreign lactors.



### It's good to be admired ...even better to be effective

Heating systems: the room sensor must not be installed in rooms with heating units complete with thermostatic valves. Avoid all sources of heat foreign to the system.





Outside probes (weather) Installation

In heating or air-conditioning systems featuring adjustment in response to outside temperature, the sensor's positioning is of paramount importance.



**General rule:** on the outer wall of the building where the living rooms are, never on the south-facing wall or in a position where they will be affected by morning sun. If in any doubt, place them on the north or north-east façade.

### Positions to be avoided



Avoid installing near windows, vents, outside the boiler room, on chimney breasts or where they are protected by balconies, cantilever roofs.

The sensor must not be painted (measurement error).

### Location

On an inner wall on the other side of the room to heating unitsheight above floor 1.5 m, at least 1.5 m away from external sources of heat (or cold).



### Installation position to be avoided

near shelving or alcoves and recesses, near doors or win-dows, inside outer walls exposed to solar radiation or currents of cold air, on inner walls with heating system pipes, domestic hot water pipes, or cooling system pipes running through them.

### Duct or pipe sensors

### Installing temperature sensors

For measuring outlet air:

- after delivery fan or
- after coil to be controlled, at a distance of at least 0,5 m

For measuring room temperature:

• before return air intake fan and near room's return airintake. For measuring saturation temperature: after mist eliminator.



Bend 0.4m sensor by hand (never use tools) as illustrated.



Use whole cross-section of duct, min. distance from walls 50 mm, radius of curvature 10 mm for 2m or 6m sensors.

### Installing combined humidity sensors

As max. humidity limit sensor on outlet (steam humidifiers).



### Installing pressure sensors

- A installation on ducts carrying fluids at max. temperature 80°C
- B installation on ducts at temperature over 80°C and for refrigerants
- C installation on ducts at high temperatures:
  - increase length of siphon
  - place sensor at side to prevent it being hit by hot air coming from the pipe.



### Installing differential pressure sensors for water

- Installation with casing facing down not allowed.-With temperature over 80°C, siphons are needed.
- To avoid damaging the sensor, you must comply with the following instructions

### when installing:

- make sure pressure difference is not greater than thevalue permitted by the sensor
- when there are high static pressures, make sure you insert shutoff valves A-B-C.

### Putting into operation

Start disable 1=open C1=open C 2=open A2=close B 3=open B3=close A 4= close C



### Immersion or strap-on sensors



Placing the probes (QAD22.../QAE21.../QAP21.../RCA...)

With pumps on outlet

### with 3 ways valves / with 4 ways valves



With pumps on return

with 3 ways valves / with 4 ways valves





### Immersion probes installation

Sensors must be installed on the stretch of pipe in which fluid circulates all the time.

The rigid stem (sensing element doing the measuring) must be inserted by at least 75mm and must face the direction of flow.

Recommended locations: on a bend or on a straight stretch of pipe but tilted by  $45^\circ$  and against the flow of fluid.

Protect them to prevent water from infiltrating (dripping gates, condensation from pipes etc.)

### Installing QAD2.. strap-on sensors

Make sure fluid is circulating in the chosen location.

Eliminate insulation and paintwork (including rust inhibitor) on a min. 100mm length of pipe.

Sensors come with straps for pipes up to 100 mm in diameter

### Strap-on or immersion sensors? QAD2.. strap-on sensors

Advantages :

- 10 sec. time constant
- Installed with system running (no plumbing work)
- Installation can be changed easily if it proves incorrect.

### Limits:

- Suitable for pipe diameters max. 100 mm
- Can be affected by currents of air etc.

### QAE2... immersion sensors

Advantages:

- Measure "mean" fluid temperature
- No external influence on measurement such as: currents of air, nearby pipes etc.

### Limits:

- Time constant with sheath: 20 sec.
- Hard to change installation position if it proves incorrect.

Installing differential pressure probes for air



A - Control a filter (clogging)



B - Control a fan (upstream/downstream)



C - Measurement of difference in pressure between two ducts



D - Measurement of difference in pressure between two rooms or of inside of duct and outside

### **Basic principles**

Measuring static pressure(i.e. pressure exerted by air on pipe walls)



### Measuring dinamic pressure



Key

- y Kg/m³, specific weight of air m/s, air speed
- g 9.81 m/s² gravity acceleration
- Pd mm C.A., dynamic pressure

### Measuring total pressure



# Spare parts

Description	Code
Modulator RWF50.2 (uscita a 3 punti - apri, fermo, chiudi)	2570148
Modulator RWF50.3 (uscita continua 0÷20mA, 4÷20mA, 0÷10V)	2570149
Temperature probe Siemens QAE2120.010A (30÷130°C)	2560101
Temperature probe Siemens QAM2120.040 (-15÷+50°C)	2560135
Thermoresistor Pt1000 ø6mm L100mm (30÷130°C)	2560188
Thermoresistor Pt1000 ø10mm L200mm (0÷350°C)	2560103
Thermoresistor Pt100 ø10mm L200mm (0÷350°C)	2560145
Thermoresistor Pt100 ø8mm L85mm (0÷120°C)	25601C3
Pressure probe Siemens QBE2 P4 (0÷4bar)	2560159
Pressure probe Siemens QBE2 P10 (0÷10bar / signal 0÷10V)	2560160
Pressure probe Siemens QBE2 P16 (0÷16bar / signal 0÷10V)	2560167
Pressure probe Siemens QBE2 P25 (0÷25bar / signal 0÷10V)	2560161
Pressure probe Siemens QBE2 P40 (0÷40bar / signal 0÷10V)	2560162
Pressure probe Danfoss MBS 3200 P 1,6 (0÷1,6bar / signal 4÷20mA)	2560189
Pressure probe Danfoss MBS 3200 P 10 (0÷10bar / signal 4÷20mA)	2560190
Pressure probe Danfoss MBS 3200 P 16 (0÷16bar / signal 4÷20mA)	2560191
Pressure probe Danfoss MBS 3200 P 25 (0÷25bar / signal 4÷20mA)	2560192
Pressure probe Danfoss MBS 3200 P 40 (0÷40bar / signal 4÷20mA)	2560193
Pressure probe Siemens 7MF1565-3BB00-1AA1 (0÷1,6bar / signal 4÷20mA)	25601A3
Pressure probe Siemens 7MF1565-3CA00-1AA1 (0÷10bar / signal 4÷20mA)	25601A4
Sonda di pressione Siemens 7MF1565-3CB00-1AA1 (0÷16bar / signal	25601A5
Pressure probe Siemens 7MF1565-3CD00-1AA1 (0÷25bar / signal 4÷20mA)	25601A6
Pressure probe Siemens 7MF1565-3CE00-1AA1 (0÷40bar / signal 4÷20mA)	25601A7
Pressure probe Gefran E3E B1V6 MV (0÷1,6bar / segnale 4÷20mA)	25601C4
Pressure probe Danfoss E3E B01D MV (0÷10bar / segnale 4÷20mA)	25601C5
Pressure probe Danfoss E3E B16U MV (0÷16bar / segnale 4÷20mA)	25601C6
Pressure probe Danfoss E3E B25U MV (0÷25bar / segnale 4÷20mA)	25601C7
Pressure probe Danfoss E3E B04D MV (0÷40bar / segnale 4÷20mA))	25601C8

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

# **KM3 Modulator**

**USER MANUAL** 

M12927CA Rel.1.0 10/2020

# MOUNTING



# **DISPLAY AND KEYS**



	Operator Mode	Editing Mode
Ţ	Access to: - Operator Commands (Timer, Setpoint selection) - Parameters - Configuration	Confirm and go to Next parameter
	Access to: - Operator additional information (Output value, running time)	Increase the displayed value or select the next element of the parameters list
	Access to: - Set Point	Decrease the displayed value or select the previous element
ß	Programmable key: Start the programmed function (Autotune, Auto/Man, Timer)	Exit from Operator commands/Parameter setting/Configuration

# **CONNECTIONS DIAGRAM**



### Probe connection:

- PT1000/NTC/PTC: between terminal 3 and 2
- PT 100: between terminal 3 and 2 with terminal 1
- **Passive pressure probe** 0/4-20 mA: between terminal 4 (+) e 1 (-) Note: out4 must be activated (IO4F must be setted to ON)
- **Powered pressure probe** 0/4-20 mA between terminal 4 (power supply), 2 (negative) e 1 (positive) Note: set IO4F to ON to activate Out4

### Power supply connection:

- Neutral wire: terminal 9
- Phase: terminal 10 (100...240 Vac)
- Close terminals 15-16 to switch to the set point 2

### Output connection:

- Channel 1: terminal 7 and 8 (burner on off)
- Channel 2: terminal 11 and 12 (servomotor opens)
- Channel 3: terminal 13 and 14 (servomotor closes)

# SETPOINT AND HYSTERESIS CONFIGURATION (SP, AL1, HAL1 parameters)

Push the 🛃 button to enter into the setpoint configuration:



To return to normal mode, press the 😨 key for 3 seconds or wait the 10s timeout

# **Operation example**



# LIMITED ACCESS LEVEL

Proceed as follows to change some parameters that are not visible in standard user mode:



Param	Description	Values	Default
SEnS	Input type	Pt1 = RTD Pt100 Pt10 = RTD Pt1000 0.20 = 020mA 4.20 = 420mA Pressure probe 0.10 = 010V 2.10 = 210V crAL= Thermocouple K	Depends on the probe
SP	Set point 1	SPLL SPLH	
AL1	AL1 threshold	AL1L AL1H (E.U.)	
HAL1	AL1 hysteresis	1 9999 (E.U.)	
Pb	Proportional band	1 9999 (E.U.)	
ti	Integral time	0 (oFF) 9999 (s)	
td	Derivative time	0 (oFF) 9999 (s)	See page 7
Str.t	Servomotor stroke time	51000 seconds	
db.S	Servomotor dead band	0100%	
SPLL	Minimum set point value	-1999 SPHL	
SPHL	Maximum set point value	SPLL 9999	
dp	Decimal point position	0 3	
SP 2	Set point 2	SPLLSPLH	60
A.SP	Selection of the active set point	"SP" " nSP"	SP

To exit the parameter setting procedure press the 😨 key (for 3 s) or wait until the timeout expiration (about 30 seconds)

Parameter Group	inP						AL1		Ъ Б Ц					SP		
Parameter	Sens	dþ	SSC	FSc	unit	104.F	AL1	HAL1	Pb	ti	td	Str.t	db.S	SPLL	SPHL	SP
						(**)	(***)	(***)	(***)	(***)	(***)					(***)
Probes		Dec	Scale	Scale			Off	No	٩		σ	servo	Band	SP	SP	Set
		Point	Min	Max								time s	Mo.	Min	Max	point
Pt1000 (130°C max)	Pt10	1			°	on	5	10	10	350	-	*	5	30	95	80
Pt1000 ( 350°C max)	PT10	1			°C	on	10	10	10	350	1	*	5	0	350	80
Pt100 (130°C max)	PT1	1			S	on	5	10	10	350	-	*	5	0	95	80
Pt100 (350°C max)	Pt1	1			°	on	10	10	10	350	-	*	5	0	350	80
Pt100 (0+100°C 4+20mA)	4.20	1	0	100		on	5	10	10	350	1	*	5	0	95	80
Thermocouple K (1200°C max)	crAL	0			°	on	20	25	10	350	-	*	5	0	1200	80
Thermocouple J (1000°C max)	ſ	0			°C	on	20	25	10	350	1	*	5	0	1000	80
4-20mA / 0-1,6barPressure probe	4.20	0	0	160		on	20	20	5	120	-	*	5	0	160	100
4-20mA / 0-10bar Pressure probe	4.20	0	0	1000		on	50	50	5	120	-	*	5	0	1000	600
4-20mA / 0-16bar Pressure probe	4.20	0	0	1600		on	80	80	5	120	-	*	5	0	1600	600
4-20mA / 0-25bar Pressure probe	4.20	0	0	2500		on	125	125	5	120	-	*	5	0	2500	600
4-20mA / 0-40bar Pressure probe	4.20	0	0	4000		on	200	200	5	120	1	*	5	0	4000	600
QBE2002 / 0-25bar Pressure probe	0.10	0	0	2500		0n	125	125	5	120	-	*	5	0	2500	600

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Probe parameters configuration MODULATORE ASCON KM3

Note:

(*) Str.t - Servomotor stroke time SQL33; STM30; SQM10; SQM40; SQM50; SQM54 = 30 (Seconds) STA12B3.41; SQN30.251; SQN72.4A4A20 = 12 (Seconds)

# (**) Out 4 ... on Display led °4 must be switched on, otherwise change the io4.F parameter value from "on" to "out4", confirm the value, quit the configuration mode then change again the io4.F parameter value from "out4" to "on".

(***) Factory settings. These values must be adapted to machine conditions

N.B. For pressure probe, SP, SPHL, SPLL parameters values are expressed in Kpa (1 bar = 100 Kpa).

# CONFIGURATION

### How to access configuration level

The configuration parameters are collected in various groups. Every group defines all parameters related with a specific function (e.g.: control, alarms, output functions).

- 1. Push the 🛃 button for more than 5 seconds. The upper display will show PASS while the lower display will show 0.
- Using  $\triangle$  and  $\nabla$  buttons set the programmed password. 2.

According to the entered password, it is possible to see a part of the parameters listed in the "configuration parameters" section.

- a. Enter "30" as password to view all the configuration parameters
- b. Enter "20" as password to view the parameters of the "limited access level". At this point, only the parameters with attribute Liv = A or Liv = O will be editable. Leave the password blank to edit "user level" parameters, that are identified by attribute Liv = O
- C.
- 3. Push the 🛃 button. If the password is correct the display will show the acronym of the first parameter group preceded by the symbol: [¬]. In other words the upper display will show: [¬] inP (group of the **Input parameters**).

The instrument is in configuration mode. To press 😨 for more than 5 seconds, the instrument will return to the "standard display.

### Keyboard functions during parameter changing:

	Operator Mode
l	When the upper display is showing a group and the lower display is blank, this key allows to enter in the selected group. When the upper display is showing a parameter and the lower display is showing its value, this key allows to store the selected value for the current parameter and access the next parameter within the same group.
	Allows to increase the value of the selected parameter.
	Allows to decrease the value of the selected parameter.
Ъ	Short presses allow you to exit the current group of parameters and select a new group. A long press terminates the configuration procedure (the instrument returns to the normal display).
ပ L	These two keys allow to return to the previous group. Proceed as follows:
	Push the 🔛 button and maintaining the pressure, then push the 🛁; release both the buttons.

# **Configuration Parameters**

inP	GRO	JP - inpu	t confiuration		
Liv	N°	Param	Description	Values	Default
A	1	SEnS	Input type	Pt1 = RTD Pt100 Pt10 = RTD Pt1000 0.20 = 020mA 4.20 = 420mA Pressure probe 0.10 = 010V 2.10 = 210V crAL= Thermocouple K	Depends on the probe
A	2	dp	Decimal point position	0 3	See page 7
A	3	SSc	Initial scale read-out for linear inputs (avaiable only if SEnS parameter is not equal to Pt1, Pt10, crAL values)	-1999 9999	0
С	4	FSc	Full scale read-out for linear input inputs (avaiable only if SEnS parameter is not equal to Pt1, Pt10, crAL values)	-1999 9999	Depends on the probe
С	5	unit	Unit of measure (present only in the case of temperature probe)	°C/°F	°C
С	6	Fil	Digital filter on the measured value	0 (= OFF) 20.0 s	1.0
С	7	inE	Selection of the Sensor Out of Range type that will enable the safety output value	or = Over range ou = Under range our = over e under range	or

С	8	oPE	Safety output value	-100 100	0
С	9	io4.F	I/O4 function selection	on = Out4 will be ever ON (used as a transmitter power supply) ,out4 = Uscita 4 (Used as digital output 4), dG2c = Digital input 2 for contact closure, dG2U = Digital input 2 driven by 12 24 VDC	on
С	10	diF1	Digital input 1 function	oFF = Not used, 1 = Alarm reset, 2 = Alarm acknowledge (ACK), 3 = Hold of the measured value, 4 = Stand by mode, 5 = Manual mode, 6 = HEAt with SP1 and CooL with SP2, 7 = Timer RUN/Hold/Reset, 8 = Timer Run, 9 = Timer Reset, 10 = Timer Run/Hold, 11 = Timer Run/Reset, with lock, 13 = Program Start, 14 = Program Reset, 15 = Program Run/Hold, 16 = Program Run/Hold, 17 = Program Run/Reset, 18 = Sequential SP selection, 19 = SP1 - SP2 selection, 20 = SP1 SP4 binary selection, 21 = Digital inputs in parallel	19
С	12	di.A	Digital Inputs Action (DI2 only if configured)	0 = DI1 direct action, DI2 direct action 1 = DI1 reverse action, DI2 direct action 2 = DI1 direct action, DI2 reverse action 3 = DI1 reverse action, DI2 reverse action	0

Out	GRO	UP- Outp	out parameters		
Liv	N°	Param	Description	Values	Default
С	14	o1F	Out 1 function	AL = Alarm output	AL
С	15	o1AL	Initial scale value of the analog retransmission	-1999 Ao1H	1
С	18	o1Ac	Out 1 action	dir = Direct action rEU = Reverse action dir.r = Direct with reversed LED ReU.r = Reverse with reversed LED	rEUr.r
С	19	o2F	Out 2 function	H.rEG = Heating output	H.rEG
С	21	o2Ac	Out 2 action	dir = Direct action rEU = Reverse action dir.r = Direct with reversed LED ReU.r = Reverse with reversed LED	dir
С	22	o3F	Out 3 function	H.rEG = Heating output	H.rEG
С	24	o3Ac	Out 3 action	dir = Direct action rEU = Reverse action dir.r = Direct with reversed LED ReU.r = Reverse with reversed LED	dir

AL1	GRO	UP - Ala	rm 1 parameters		
Liv	N°	Param	Descrizione	Values	Default
С	28	AL1t	Tipo allarme AL1	nonE = Alarm not used LoAb = Absolute low alarm HiAb = Absolute high alarm LHAo = Windows alarm in alarm outside the windows LHAI = Windows alarm in alarm inside the	HidE

				windows	
				SE.br = Sensor Break	
				LodE = Deviation low alarm (relative)	
				HidE = Deviation high alarm (relative)	
				LHdo = Relative band alarm in alarm out of the	
				band	
				LHdi = Relative band alarm in alarm inside the	
				band	
С	29	Ab1	Alarm 1 function	0 15	0
				+1 = Not active at power up	
				+2 = Latched alarm (manual reset)	
				+4 = Acknowledgeable alarm	
				+8 = Relative alarm not active at set point change	
С	30	AL1L	For High and low alarms, it is the low limit	-1999 AL1H (E.U.)	-199.9
			of the AL1 threshold;		
			For band alarm, it is low alarm threshold		
С	31	AL1H	For High and low alarms, it is the high	AL1L 9999 (E.U.)	999.9
			limit of the AL1 threshold;		
			For band alarm, it is high alarm threshold		
0	32	AL1	AL1 threshold	AL1L AL1H (E.U.)	See
					page 7
0	33	HAL1	AL1 hysteresis	1 9999 (E.U.)	See
					page 7
С	34	AL1d	AL1 delay	0 (oFF) 9999 (s)	oFF
С	35	AL10	Alarm 1 enabling during Stand-by mode and	0 = Alarm 1 disabled during Stand by and out of	1
			out of range conditions	range	
				1 = Alarm 1 enabled in stand by mode	
				2 = Alarm 1 enabled in out of range condition	
				3 = Alarm 1 enabled in stand by mode and in	
				overrange	
				condition	

GRU	JPPO	AL2 - pa	rametri allarme 2		
Liv	N°	Param	Description	Values	Default
С	36	AL2t	Alarm 2 type	nonE = Alarm not used LoAb = Absolute low alarm HiAb = Absolute high alarm LHAo = Windows alarm in alarm outside the windows LHAI = Windows alarm in alarm inside the windows SE.br = Sensor Break LodE = Deviation low alarm (relative) HidE = Deviation high alarm (relative) LHdo = Relative band alarm in alarm out of the band LHdi = Relative band alarm in alarm inside the band	SE.br
С	37	Ab2	Alarm 2 function	0 15 +1 = Not active at power up +2 = Latched alarm (manual reset) +4 = Acknowledgeable alarm +8 = Relative alarm not active at set point change	0
С	42	AL2d	AL2 hysteresis	0 (oFF) 9999 (s)	oFF
С	43	AL20	Alarm 2 enabling during Stand-by mode and out of range conditions	<ul> <li>0 = Alarm 2 disabled during Stand by and out of range</li> <li>1 = Alarm 2 enabled in stand by mode</li> <li>2 = Alarm 2 enabled in out of range condition</li> <li>3 = Alarm 2 enabled in stand by mode and in overrange</li> <li>condition</li> </ul>	0

AL3	Grou	ıp - alarn	n 3 parameters		
Liv	N°	Param	Description	Values	Default
	44	AL3t	Alarm 3 type	nonE = Alarm not usedLoAb = Absolute low alarmHiAb = Absolute high alarmLHAo = Windows alarm in alarm outside thewindowsLHAI = Windows alarm in alarm inside thewindowsSE.br = Sensor BreakLodE = Deviation low alarm (relative)HidE = Deviation high alarm (relative)LHdo = Relative band alarm in alarm out of thebandLHdi = Relative band alarm in alarm inside the	nonE

LbA	Gro	up - Loo	p break alarm		
Liv	N°	Param	Descrizione	Values	Default
С	52	LbAt	LBA time	Da 0 (oFF) a 9999 (s)	oFF

rEG	Grou	up - Cont	rol parameters		
Liv	N°	Param	Description	Values	Default
С	56	cont	Control type	Pid = PID (heat and/or) On.FA = ON/OFF asymmetric hysteresis On.FS = ON/OFF symmetric hysteresis nr = Heat/Cool ON/OFF control with neutral zone 3Pt = Servomotor control (available only when Output 2 and Output 3 have been ordered as "M")	3pt
С	57	Auto	Autotuning selection	<ul> <li>-4 = Oscillating auto-tune with automaticrestart at power up and after all point change</li> <li>-3 = Oscillating auto-tune with manual start</li> <li>-2 = Oscillating -tune with auto-matic start at the first power up only</li> <li>-1 = Oscillating auto-tune with auto-matic restart at every power up</li> <li>0 = Not used</li> <li>1 = Fast auto tuning with automatic restart at every power up</li> <li>2 = Fast auto-tune with automatic start the first power up only</li> <li>3 = FAST auto-tune with automatic restart at power up and after set point change</li> <li>5 = Evo-tune with automatic restart at every power up</li> <li>6 = Evo-tune with automatic start the first power up and after set point change</li> <li>5 = Evo-tune with automatic restart at every power up</li> <li>6 = Evo-tune with automatic start the first power up and after set point change</li> <li>5 = Evo-tune with automatic restart at every power up</li> <li>6 = Evo-tune with automatic start the first power up and after set point change</li> </ul>	7
С	58	tunE	Manual start of the Autotuning	oFF = Not active on = Active	oFF

С	59	SELF	Self tuning enabling	no = The instrument does not perform the self- tuning YES = The instrument is performing the self- tuning	No
A	62	Pb	Proportional band	1 9999 (E.U.)	See page 7
A	63	ti	Integral time	0 (oFF) 9999 (s)	See page 7
A	64	td	Derivative time	0 (oFF) 9999 (s)	See page 7
С	65	Fuoc	Fuzzy overshoot control	0.00 2.00	1
С	69	rS	Manual reset (Integral pre-load)	-100.0 +100.0 (%)	0.0
A	70	Str.t	Servomotor stroke time	51000 seconds	See page 7
A	71	db.S	Servomotor dead band	0100%	5
С	72	od	Delay at power up	0.00 (oFF) 99.59 (hh.mm)	oFF

SP (	SP Group - Set point parameters				
Liv	N°	Param	Description	Values	Default
С	76	nSP	Number of used set points	1 4	2
A	77	SPLL	Minimum set point value	-1999 SPHL	See page 7
A	78	SPHL	Maximum set point value	SPLL 9999	See page 7
0	79	SP	Set point 1	SPLL SPLH	See page 7
С	80	SP 2	Set point 2	SPLL SPLH	60
	83	A.SP	Selection of the active set point	"SP" " nSP"	SP
С	84	SP.rt	Remote set point type	RSP = The value coming from serial link is used as remote set point trin = The value will be added to the local set point selected by A.SP and the sum becomes the operative set point PErc = The value will be scaled on the input range and this value will be used as remote SP	trin
С	85	SPLr	Local/remote set point selection	Loc = Local rEn = Remote	Loc
С	86	SP.u	Rate of rise for POSITIVE set point change (ramp UP)	0.01 99.99 (inF) Eng. units per minute	inF
С	87	SP.d	Rate of rise for NEGATIVE set point change (ramp DOWN)	0.01 99.99 (inF) Eng. units per minute	inF

PAn Group - Operator HMI					
Liv	N°	Param	Description	Values	Default
С	118	PAS2	Level 2 password (limited access level)	oFF (Level 2 not protected by password) 1 200	20
С	119	PAS3	Level 3 password (complete configuration level)	3 300	30
С	120	PAS4	Password livello (livello configurazione a codice)	201 400	300
С	121	uSrb	button function during RUN TIME	nonE = No function tunE = Auto-tune/self-tune enabling. A single press (longer than 1 second) starts the auto-tune oPLo = Manual mode. The first pressure puts the instrument in manual mode (OPLO) while a second one puts the instrument in Auto mode	tunE

				AAc = Alarm reset	
				ASi = Alarm acknowledge	
				chSP = Sequential set point selection	
				St.by = Stand by mode. The first press puts the	
				instrument in stand by	
				mode while a second one puts the instrument in	
				Auto mode.	
				Str.t = Timer run/hold/reset	
				P.run = Program run	
				P.rES = Program reset	
				P.r.H.r = Program run/hold/reset	
С	122	diSP	Display management	Spo = Operative set point	SPo
С	123	di.cL	Display colour	0 = The display colour is used to show the actual	2
				deviation (PV - SP)	
				1 = Display red (fix)	
				2 = Display green (fix)	
				3 = Display orange (fix)	
		diS.t	Display Timeout	oFF (display always ON)	oFF
	125			0.1 99.59 (mm.ss)	
С	126	fiLd	Filter on the displayed value	oFF (filter disabled)	oFF
				From 0.0 (oFF) to 20.0 (E.U.)	
С	128	dSPu	Instrument status at power ON	AS.Pr = Starts in the same way it was prior to the	Auto
				power down	
				Auto = Starts in Auto mode	
				oP.0 = Starts in manual mode with a power	
				output equal to zero	
				St.bY = Starts in stand-by mode	
С	129	oPr.E	Operative modes enabling	ALL = All modes will be selectable by the next	ALL
				parameter	
				Au.oP = Auto and manual (OPLO) mode only will	
				be selectable by the next parameter	
				Au.Sb = Auto and Stand-by modes only will be	
				selectable by the next parameter	
С	130	oPEr	Operative mode selection	If oPr.E = ALL: - Auto = Auto mode	Auto
				- oPLo = Manual mode	
				- St.bY = Stand by mode	
				If oPr.E = Au.oP: - Auto = Auto mode	
				- oPLo = Manual mode	
				If oPr.E = Au.Sb: - Auto = Auto mode	
1	1			- St.bY = Stand by mode	

SEr Group - Serial link parameter					
Liv	N°	Param	Description	Values	Default
С	131	Add	Instrument address	oFF 1 254	1
С	132	bAud	baud rate	1200 = 1200 baud 2400 = 2400 baud 9600 = 9600 baud 19.2 = 19200 baud 38.4 = 38400 baud	9600
С	133	trSP	Selection of the value to be retransmitted (Master)	nonE = Retransmission not used (the instrument is a slave) rSP = The instrument becomes a Master and retransmits the operative set point PErc = The instrument become a Master and it retransmits the power output	nonE

Liv	N°	Param	Description	Values	Default
Liv C	<b>№</b> 134	Param Co.tY	Description           Count type	ValuesoFF = Not used1 = Instantaneous power (kW)2 = Power consumption (kW/h)3 = Energy used during program execution. This measure starts from zero when a program runs end stops at the end of the program. A new program execution will reset the value 4 = Total worked days: number of hours the instrument is turned ON divided by 24.5 = Total worked hours: number of hours the instrument is turned ON.6 = Total worked hours: number of hours the instrument is turned ON.6 = Total worked days with threshold: number of 	<b>Default</b> oFF
-				threshold set in [137] h.Job. 11 = Totalizer of control relay worked hours with threshold: number of hours the control relay has been in ON condition, the controller is forced in stand-by when Co.ty value reaches the threshold set in [137] h.Job.	-
С	138	t.Job	Worked time (not resettable)	0 9999 days	0

cAL Group - User calibration group					
Liv	N°	Param	Description	Values	Default
С	139	AL.P	Adjust Low Point	From -1999 to (AH.P - 10) in engineering units	0
С	140	AL.o	Adjust Low Offset	-300 +300 (E.U.)	0
С	141	AH.P	Adjust High Point	From (AL.P + 10) to 9999 engineering units	999.9
С	142	AH.o	Adjust High Offset	-300 +300	0

# **OPERATIVE MODES**

When the instrument is powered, it starts immediately to work according to the parameters values loaded in its memory. The instrument behaviour and its performance are governed by the value of the stored parameters.

At power ON the instrument can start in one of the following mode depending on its configuration:

Automatic Mode In Automatic mode the instrument drives automatically the control output according to the parameter value set and the set point/measured value.

**Manual Mode** (OPLO): In Manual mode the the upper display shows the measured value while the lower display shows the power output [preceded by H (for heating) or C (for cooling)], MAN is lit and the instrument allows you to set manually the control output power. No Automatic action will be made.

**Stand by Mode** (St.bY): In stand-by mode the instrument operates as an indicator. It will show on the upper display the measured value and on the lower display the set point alternately to the "St.bY" messages and forces the control outputs to zero.

We define all the above described conditions as "Standard Display".

As we have seen, it is always possible to modify the value assigned to a parameter independently from the operative modes selected.

# AUTOMATIC MODE

Keyboard function when the instrument is in Auto mode:

	Modo Operatore
ſ	Allows entry into parameter modification procedures
	Allows you to start the "Direct set point modification" function (see below).
0	Allows you to display the "additional informations" (see below).
P	Performs the action programmed by [121] uSrb ( Perbutton function during RUN TIME) parameter

### Additional information

This instrument is able to show you some additional informations that can help you to manage your system. The additional informations are related to how the instrument is programmed, hence in many cases, only part of this information is available.

- 1. When the instrument is showing the "standard display" push 🛆 button. The lower display will show H or c followed by a number. This value is the current power output applied to the process. The H show you that the action is a Heating action while the "c" show you that the action is a Cooling action
- 2. Push button again. When the programmer is running the lower display will show the segment currently performed and the Event status as shown below:

where the first character can be r for a ramp or S for a soak, the next digit show the number of the segment (e.g. S3 means Soak number 3) and the twoless significant digits (LSD) show you the status of the two event (the LSD is the Event 2)..

- 3. Push button again. When the programmer is running the lower display will show the theoretical remaining time to the end of the program preceded by a "P" letter:
  - <u> P843</u>
- 4. Push 🛆 button again. When the wattmeter function is running the lower display will show U followed by the measured energy..
- 5. Push button. When the "Worked time count" is running the lower display will show "d" for days or "h" for hours followed by the measured time.
- 6. Push 🛆 button. The instrument returns to the "standard display".

Note: The additional information visualization is subject to a time out. If no button is pressed for more than 10 second the instrument comes automatically back to the Standard display..

### Direct set point modification

This function allows to modify rapidly the set point value selected by [83] A.SP (selection of the active Set point) or to the set point of the segment group (of the programmer) currently in progress.

- 1. Push **V** button. The upper display shows the acronym of the selected set point (e.g. SP2) and the lower display will show its value.
- 2. By  $\triangle$  and  $\nabla$  buttons, assign to this parameter the desired value
- 3. Do not push any button for more than 5 second or push the 🛃 button. In both cases the instrument memorize the new value and come back to the "standard display".

### Manual mode

This operative mode allows you to deactivate automatic control and manually program the percentage power output to the process. When the instrument is in manual mode, the upper display shows the measured value while the lower display shows the power output [preceded by H (for heating action) or C (for cooling action)] The MAN LED is lit. When manual control is selected, the instrument will start to operate with the same power output as the last one supplied by automatic mode and can be modified using the  $\triangle$  and  $\nabla$  buttons.

In case of ON/OFF control, 0% corresponds to the deactivated output while any value different from 0 corresponds to the activated output. As in the case of visualization, the programmable values range from H100 (100% output power with reverse action) to C100 (100% output power with direct action).

### Notes:

- During manual mode, the alarms are operative.
- If you set manual modes during program execution, the program will be frozen and it will restart when the instrument will come back to Auto mode.
- If you set manual modes during self-tune execution, the self- tune function will be aborted.
- During manual mode, all functions not related with the control (wattmeter, independent timer, "worked time", etc) continue to operate normally..

### STAND-BY MODE

This operative mode also deactivates the automatic control but forces the control output to zero. In this mode the instrument operates as an indicator. When the instrument is in stand by mode the upper display will show the measured value while the lower display will show alternately the set point and the message "St.bY".

Notes:

- During stand by mode, the relative alarms are disabled while the absolute alarms are operative or not according to the ALxo (Alarm x enabling during Stand-by mode) parameter setting.
- If you set stand by mode during program execution, the program will be aborted.
- If you set stand by mode during self-tune execution, the self- tune function will be aborted.
- During stand by mode, all functions not related with the control (wattmeter, independent timer, "worked time", etc) continue to operate normally.
- When the instrument is swapped from stand by to auto modes, the instrument will start automatically the alarm masking, the soft start functions and the auto-tune (if programmed).

# AUTOTUNE (EVOTUNE)

Evotune is a fast and fully automatic procedure that can be started in any condition, regardless the deviation from SP. The controller selects automatically the best tune method and computes the optimum PID parameters. To activate Evotune press 😨 button for 3 seconds.

# **ERROR MESSAGES**

The upper display shows the OVER-RANGE and UNDERRANGE conditions with the following indications:

Over-range:

Under-range

The sensor break will be signalled as an out of range:

Note: When an over-range or an under-range is detected, the alarms operate as in presence of the maximum or the minimum measurable value respectively.

To check the out of span Error condition, proceed as follows:

- 1. Check the input signal source and the connecting line.
- 2. Make sure that the input signal is in accordance with the instrument configuration. Otherwise, modify the input configuration.
- 3. If no error is detected, send the instrument to your supplier to be checked.

### List of possible errors

**ErAT** Fast Auto-tune cannot start. The measure value is tooclose to the set point. Push the button in order to delete the error message.

**ouLd** Overload on the out 4. The messages shows that a short circuit is present on the Out 4 when it is used as output or as a transmitter power suply. When the short circuit disappears the output restart to operate..

NoAt Auto-tune not finished within 12 hours.

**ErEP** Possible problem of the instrument memory. The messages disappears automatically. When the error continues, send the instrument to your supplier.

RonE Possible problem of the firmware memory. When this error is detected, send the instrument to your supplier.

Errt Possible problem of the calibration memory. When this error is detected, send the instrument to your supplier.

# FACTORY RESET

Sometime, e.g. when you re-configure an instrument previously used for other works or from other people or when you have made too many errors during configuration and you decided to re-configure the instrument, it is possible to restore the factory configuration. This action allows to put the instrument in a defined condition (the same it was at the first power ON).

The default data are those typical values loaded in the instrument prior to ship it from factory. To load the factory default parameter set, proceed as follows:

- 1. Press the 🖵 button for more than 5 seconds. The upper display will show PASS while the lower display shows 0;
- 2. Using  $\triangle$  and  $\nabla$  buttons set the value -481;
- 3. Push 🗖 button;
- 4. The instrument will turn OFF all LEDs for a few seconds, then the upper display will show dFLt (default) and then all LEDs are turned ON for 2 seconds. At this point the instrument restarts as for a new power ON.

The procedure is complete.

Note: The complete list of the default parameters is available in Chapter "Configuration".

# RWF55.5X & RWF55.6X



User manual



Drilling dimensions:



2


### NAVIGATION MENU



RWF55 is preset good for 90% of applications. However, you can set or edit parameters as follow:

# Set-point: set or modification:

When the burner is in stand-by, (safety loop open, that is terminals 3-4/T1-T2 on the 7 pole plug open) push the Enter button: on the lower display (green) Opr appears; push Enter again and in the same display SP1 appears. Push Enter again and the lower display (green SP1) flashes. Using the up and down arrows change the set-point on the upper display (red).Push Enter to confirm and push ESC more times to get the home position.

# PID parameters set and modifications (PArA):

Push Enter button, on the green display **Opr** appears; using the **down arrow**, scroll until group **PArA** is reached and push Enter. On the green display **Pb1** e appears and on the red one the set parameter. Push is sequence the **down or up** arrow the menu is scrolled. Push Enter to select and the **arrows** to choose the desired value. Enter to confirm

Parameter	Display	Range	Factory setting	Remarks
Proportional band	Pb1	1 9999 digit	10	Typical value for temperature
erivative action	dt	0 9999 sec.	80	Typical value for temperature
Integral action	rt	0 9999 sec.	350	Typical value for temperatureT
Dead band(*)	db	0… 999,9 digit	1	Typical value
Servocontrol running time	tt	10 3000 sec.	15	Set servocontrol running time
Switch-on differential(*)	HYS1	0,01999 digit	-5	Value under setpoint below which the burner switches back on (1N-1P closes)
Switch-off differential 2° stage (*)	HYS2	0,0 HYS3	3	(enable only with parameter bin1 = 4)
Upper switch-off differential (*)	HYS3	0,0 9999 digit	5	Value over setpoint above which the burner switches off (1N-1P opens)
Switch-on differential on cooling controller (*)	HYS4	0,0… 9999 digit	5	Do not used (enable only with parameter <b>CACt</b> = 0)
Switch-off differential 2° stage on cooling controller (*)	HYS5	HYS60,0 digit	5	Do not used (enable only with parameter <b>CACt</b> = 0 and parame- ter <b>bin1</b> =0)
Upper switch-off differential on cooling controller (*)	HYS6	0,01999 digit	5	Do not used (enable only with parameter CACt = 0)
Delay modulation	q	0,0… 999,9 digit	0	Do not alter
T Outside temperature Curve point 1 (*)	At1	-40120 digit	-10	First point of external temperature for climatic curve
Boiler temperature Curve point 1 (*)	Ht1	SPLSPH	60	Set-point temperature for the external temperature 1
TT Outside temperature Curve point 2(*)	At2	-40120 digit	20	Second point of external temperature for climatic curve
Boiler temperature Curve point 2 (*)	Ht2	SPLSPH	50	Set-point temperature for the external temperature 2

(*) Parameters affected by setting of decimal place (ConF > dISP parameter dECP)

### Setting the kind of sensor to be connected to the device:

Push the **Enter** button: on the lower display (green) **Opr** appears. Using the **up and down arrows** find **ConF.** Push **Enter** to confirm. Now on the green display the group **InP** appears. Push **Enter** and **InP1** is displaied. Enter to confirm. You are inside **InP1**; the green display shows **Sen1** (sensor type), while the red display shows the chosen sensor code Push **Enter** to enter the **Sen1** parameter, then choose the desired sensor using the **arrows**. Push **Enter** to confirm and **ESC** to escape.

Once selected the sensor, you can modify all the other parameters using up and down arrows according to the tables here below :

#### ConF > InP >InP1

Parameter	Value	Description			
SEn1	1	Pt100 3 wire			
type of sensor for analog	2	Pt100 2 wire			
input 1	3	Pt1000 3 wire			
1	4	Pt1000 2 wire			
	5	Ni1000 3 wire			
	6	Ni1000 2 wire			
	7	0 ÷ 135 ohm			
	8	Cu-CuNi T			
	9	Fe-CuNi J			
	10	NiCr-Ni K			
	11	NiCrSi-NiSi N			
	12	Pt10Rh-Pt S			
	13	Pt13Rh-Pt R			
	14	Pt30Rh-Pt6Rh B			
	15	0 ÷ 20mA			
	16	4 ÷ 20mA			
	17	0 ÷ 10V			
	18	0 ÷ 5V			
	19	1 ÷ 5V			
OFF1	-1999 <b>0</b> +9999	Correction value measured by the sensor			
Sensor offset					
SCL1	-1999 <b>0</b> +9999	minimum scale value(for input ohm, mA, V)			
scale low level					
SCH1	-1999 <b>100</b> +9999	maximum scale value(for input ohm, mA, V)			
scale high level					
dF1	0 <b>0,6</b> 100	Is used to adapt the digital 2nd order input filter (time in s; 0 s = filter off)			
digital filter					
Unit	1	1 = <b>degrees</b> Celsius			
	2	2 = degrees Fahrenheit			
temperature unit					

# ConF > InP > InP2

Input 2 : this input can be used to specify an external setpoint or carry out setpoint shifting

Parameter	Value	Description
FnC2	0	0= no function
	1	1= external setpoint (display <b>SPE</b> )
	2	2 =setpoint shifting (display <b>dSP</b> )
	3	3 = angular positioning feedback
SEn2	1	0 ÷ 20mA
tisensor type input 2	2	4 ÷ 20mA
	3	0 ÷ 10V
	4	0 ÷ 5V
	5	1 ÷ 5V
	1	0 ÷ 20mA
OFF2	-1999 <b>0</b> +9999	Correction value measured by the sensor
Sensor offset		
SCL2	-1999 <b>0</b> +9999	minimum scale value(for input ohm, mA, V)
scale low level		
SCH2	-1999 <b>100</b> +9999	maximum scale value(for input ohm, mA, V)
scale high level		
dF2	0 <b>2</b> 100	Is used to adapt the digital 2nd order input filter (time in s; 0 s = filter off)
digital filter		

(**bold** = factory settings)

# ConF > InP >InP3

Input 3: this input is used to acquire the outside temperature

Parameter	Value	Description
SEn3	0	0 =
sensor type input 3sensor	1	1 = wire
type input 2	2	2 = wire
OFF3	-1999 <b>0</b> +9999	Correction value measured by the sensor
Sensor offset		
dF3	0 <b>1278</b> 1500	Is used to adapt the digital 2nd order input filter (time in s; 0 s = filter off)
digital filter		

# ConF > Cntr

Here, the type of controller, operating action, setpoint limits and presettings for self-optimization are selected

Parameter	Value	Description
CtYP	1	1 = 3-position controller (open-stop-close)
controller type	2	2 = continuative action controller (0 ÷10V or 4 ÷ 20mA)
CACt	1	1 = heating controller
control action	0	0 = cooling controller
SPL	-1999 <b>0</b> +9999	minimum set-point scale
least value of the set-point range		
SPH	-1999 <b>100</b> +999	maximum set-point scale
maximum value of the set- point range		
	0	0 = Free
Self-optimization	1	1 = Locked
		Self-optimization can only be disabled or enabled via the ACS411 setup program.
		Self-optimization is also disabled when the parameter level is locked
oLLo	<b>-1999</b> +9999	lower working range limit
set-point limitation start, operation limit low		
oLHi	-1999 <b>+9999</b>	upper working range limit
set-point limitation end, operation limit high		

(bold = factory settings)

# ConF > rAFC

Activation boiler shock termic protetion:

RWF55.. can activate the thermal shock protection only on sites where the set-point is lower than 250°C and according to **rAL** parameter

Parameter	Value	Description
FnCT		tchoose type of range degrees/time
type of contol	0	0 = deactived
	1	1 = Kelvin degrees/minute
	2	2 = Kelvin degrees/hour
rASL		Slope of thermal shock protection (only with functions 1 and 2)
ramp rate	<b>0,0</b> 999,9	
toLP	<b>2 x (HYS1) = 10</b> 9999	width of tolerance band (in K) about the set-point
tolerance band ramp		0 = tolerance band inactive
rAL ramp limit	<b>0</b> 250	Ramp limit. When this value is lower than the temperature set-point, the RWF controls the output increasing the temp set point step by step accor-
		ding to <b>rASL</b> . If this is over the temp set point, the control is performed in cooling

# Alarm functionAF

The alarm function can be used to monitor the analog inputs. If the limit value is exceeded, multifunctional relay K6 (terminals **6N** and **6P**) is activated (depending on the switching characteristic)

The alarm function can have different switching functions (lk1 to lk8) and can be set to a deviation from the active setpoint or to a fixed limit value

Limit value AL relative to setpoint (x)



Fixed limit value AL



# ConF > AF

Parameter	Value	Description
FnCt	0	0 = Without function
type of control	1	k1 = monitored input InP1
	2	lk2 = monitored input InP1
	3	k3 = monitored input InP1
	4	k4 = monitored input InP1
	5	k5 = monitored input InP1
	6	k6 = monitored input InP1
	/	k7 = monitored input InP1
	0 0	k8 = monitored input InP1
	9 10	lk7 = monitored input InP2
	10	lk8 = monitored input InP2
	12	lk7 = monitored input InP3
		lk8 = monitored input InP3
Alarm value	-1999	Limit value or deviation from setpoint to be monitored (see alarm functions
AL	0	<b>Ik1</b> to <b>Ik8</b> : limit value <b>AL</b> )
	1999	Limit value range for <b>lk1</b> and <b>lk2</b> 09999
HySt	0	Switching differential for limit value AL
switching differential	1	
	9999	
ACrA	0	Switched-off
response by out of range	1	ON
		Switching state in the case of measuring range overshoot or undershoot (Out of Range)

(bold = factory settings)

# ConF > OutP

For fuel-air ratio control purposes, the RWF55 has the binary outputs K2, K3 (terminals KQ,K2, K3) and the analog output (terminals A+, A-). The burner is released via relay K1 (terminals 1N, 1P).

The binary outputs of the RWF55 offer no setting choices

The RWF55 has an analog output.

The analog output offers the following setting choices:

Parameter	Value	Description
FnCt	1	1 = analog input 1 doubling with possibility to convert
type of control	2	2 = analog input 2 doubling with possibility to convert
	3	3 = analog input 3 doubling with possibility to convert
	4	4 = Controller's angular positioning is delivered (modulating controller)
SiGn		physical output signal (terminals A+, A-)
type of output signal	0	0 = 0÷20mA
	1	1 = 4÷20mA
	2	2 = 0÷10V DC
rOut	<b>0</b> 101	signal (in percent) when measurement range is crossed
value when out of input		
range		
oPnt	-1999 <b>0</b> +9999	A value range of the output variable is assigned to a physical output signal (for
zero point		FnCt = 1, 2, 3)
End	-1999 <b>100</b> +9999	A value range of the output variable is assigned to a physical output signal (for
end point		<b>FnCt =</b> 1, 2, 3)

# ConF > binF

This setting decides on the use of the binary inputs**D1**, **D2**, **DG** b

Parameter	Value	Description
bin1	0	0 = without function
binary imput 1 (terminals DG	1	1 = set-point changeover (SP1 / SP2)
– D1)	2	2 = lset-point shift (Opr > dSP parameter = value of set-point modify)
	3	β = input alarm
bin2	4	changeover of operating mode
binary imput 2 (terminalsκ		DG-D2 open = modulating operation
DG – D2)		DG-D2 close = 2 stage operation

(bold = factory settings)

# ConF > dISP

.Both displays can be customized to suit your needs by configuring the displayed value, decimal, time out and blocking

Parameter	Value	Description
diSU		Display value for upper display:
pper display (red)	0	0 = display power-off
	1	1 = analog input 1 (InP1) value
	2	2 = analog input 2 (InP2) value
	3	3 = analog input 3 (InP3) value
	4	4 = controller's angular positioning
	7	6 = set-point valueв
	,	7 = end value with thermal shock protection
diSL		Display value for lower display3:
lower display (green)	0	0 = display power-off
	1	1 = analog input 2 (InP2) value
	2	2 = analog input 2 (InP2) value
	3	3 = analog input 2 (InP2) value
	4 c	4 = controller's angular positioning
	<b>0</b> 7	6 = set-point valueв
	,	7 = end value with thermal shock protection
tout	0 <b>180</b> 250	time (s) on completion of which the controller returns automatically to the
timeout		basic display, if no button is pressed
dECP	0	0 = no decimal place
decimal point	1	1 = one decimal place
	2	2 = two decimal place
CodE	0	0 = no lockout
level lockout	1	1 = configuration level lockout (ConF)
	2	2 = parameter and configuration level lockout (PArA & ConF)
	3	3 = keyboard lockout

# ConF > IntF

The controller can be integrated into a data network using an optional RS-485 (terminals R+ and R-) interface or an optional Profibus DP interface(<u>only model</u>RWF55.6x_terminalsC1-C2-C3-C4)

Parameter	Value	Description
bdrt	0	0 = 4800 baud
baudrate	1	1 = 9600 baud
	2	2 = 19200 baud
	3	3 = 38400 baud
Adr	0	Address in the data network
Device address Modbus	1	
	254	
dP	0 <b>125</b>	only withRWF55.6x
Device address Profibus		
dtt	0	0 = swiched-off
Remote detection time	30	
	7200s	

(**bold** = factory settings)

# Manual control :

In order to manual change the burner load, while firing keep pushing the **ESC** button for more than 5 s; on the lower green display **Hand** appears.

using the **UP** and **DOWN** arrows, the load varies.

Keep pushing the **ESC** button for getting the normal operation again.

NB: every time the device shuts the burner down (start led switched off - contact 1N-1P open), the manual control is not active.

# Device self-setting (auto-tuning):

If the burner in the steady state does not respond properly to heat generator requests, you can activate the Device's self-setting function, which recalculates PID values for its operation, deciding which are most suitable for the specific kind of request

SIEN	IEN:	5				
		2	6			
<del>П</del>		Ŀ				
	$\bigtriangledown$		С	<mark>K6</mark>	J	

Follow the below instructions:

push the **UP** and **DOWN** arrows for more than 5 s; on the green lower display **tUnE** appears. Now the device pushes the burner to increase and decrease its output. During this time, the device calculates **PID** parameters (**Pb1**, **dt** and **rt**). After the calculations, the **tUnE** is automatically deactivated and the device has already stored them.

In order to stop the Auto-tuning function while it works, push again the **UP** and **DOWN** arrows for more than 5 s. The calculated **PID** parameters can be manually modified following the previously described instructions.

# Display of software version :

The software version is shown by pushing Enter + UP arrow on the upper display.



# Weather-compensated setpoint shifting(climatic regulation):

The RWF55 can be configured so that weather-compensated setpoint shifting is activated when an LG-Ni1000 outside sensor or a Pt1000 is connected (see parameter **InP3**).

To take into account the time response of a building, weather-compensated setpoint shifting uses the attenuated outside temperature rather than the current outside temperature

The minimum and maximum setpoints can be set using the lower setpoint limit **SPL** and the upper setpoint limit **SPH** of the menù **Crtr**. The system also prevents the lower working range limit **oLLo** and upper working range limit **oLHi** from exceeding/dropping below the system temperature limits.

The heating curve describes the relationship between the boiler temperature setpoint and the outside temperature. It is defined by 2 curve points. For 2 outside temperatures, the user defines the boiler temperature setpoint that is required in each case. The heating curve for the weather-compensated setpoint is calculated on this basis. The effective boiler temperature setpoint is limited by the upper setpoint limit **SPH** and the lower setpoint limit **SPL**.



For setting climatic regulation function set:

PArA > parametersAt1, Ht1, At2, Ht2

ConF > InP > InP3 parametersSEn3, FnC3 = 1 (Weather-compensated setpoint).

# Modbus interface

The tables that follow in this chapter specify the addresses of the readable and writable words that the customer is able to access. The customer may read and/or write the values using SCADA programs, PLCs, or similar.

The entries under Access have the following meanings:

 $\ensuremath{\textbf{R/O}}$  Read Only, value can only be read

R/W Read/Write, value can be read and written

The number of characters specified under Data type in the case of character strings includes the final \0.

Char10 means that the text is up to 9 characters long. The final \0 character is then added to this

# User level

Address	Access	Data type	Signal reference	Parameter
0x0000	R/O	Float	X1	Analog input InP1
0x0002	R/O	Float	X2	Analog input InP2
0x0004	R/O	Float	X3	Analog input InP2
0x0006	R/O	Float	WR	Actual setpoint
0x0008	R/W	Float	SP1	Setpoint 1
0x000A	R/W	Float	SP2 (= dSP)	Setpoint 2
0x1035	R/O	Float		Analog input InP3 (unfiltered)
0x1043	R/O	Float		Actual angular positioning
0x1058	R/O	Word	B1	Burner alarm

#### Parameter level

Address	Access	Data type	Signal reference	Parameter
0x3000	R/W	Float	Pb1	Proportional range 1
0x3004	R/W	Float	dt	Derivative action time
0x3006	R/W	Float	rt	Integral action time
0x300C	R/W	Float	db	Dead band
0x3012	R/W	Word	tt	Controlling element running time
0x3016	R/W	Float	HYS1	Switch-on threshold
0x3018	R/W	Float	HYS2	Switch-off threshold down
0x301A	R/W	Float	HYS3	Switch-off threshold up
0x301C	R/W	Float	HYS4	Switch-on threshold (cooling)
0x301E	R/W	Float	HYS5	Switch-off threshold down (cooling)
0x3020	R/W	Float	HYS6	Switch-off threshold up (cooling)
0x3022	R/W	Float	q	Reaction threshold
0x3080	R/W	Float	At1	Outside temperature 1
0x3082	R/W	Float	Ht2	Boiler temperature 1
0x3084	R/W	Float	At2	Outside temperature 2
0x3086	R/W	Float	Ht2	Boiler temperature 2

# **Configuration level**

Address	Access	Data type	Signal reference	Parameter
0x3426	R/W	Float	SCL1	Start of display input 1
0x3428	R/W	Float	SCH1	End of display input 1
0x3432	R/W	Float	SCL2	Start value input 2
0x3434	R/W	Float	SCH2	End value input 2
0x3486	R/W	Float	SPL	Start of setpoint limitation
0x3488	R/W	Float	SPH	End of setpoint limitation
0x342A	R/W	Float	OFFS1	Offset input E1
0x3436	R/W	Float	OFFS2	Offset input E2
0x343A	R/W	Float	OFFS3	Offset input E3
0x1063	R/W	Word	FnCt	Ramp function
0x1065	R/W	Float	rASL	Ramp slope
0x1067	R/W	Float	toLP	Tolerance band ramp
0x1069	R/W	Float	rAL	Limit value
0x1075	R/W	Float	dtt	Remote Detection Timer
0x1077	R/W	Float	dF1	Filter constant input 1
0x1079	R/W	Float	dF2	Filter constant input 2
0x107B	R/W	Float	dF3	Filter constant input 3
0x107D	R/O	Float	oLLo	Lower working range limit
0x107F	R/O	Float	oLHi	Upper working range limit
0x106D	R/W	Word	FnCt	Alarm relay function
0x106F	R/W	Float	AL	Alarm relay limit value (limit value alarm)
0x1071	R/W	Float	HYSt	Alarm relay hysteresis

# Remote operation

Address	Access	Data type	Signal reference	Parameter
0x0500	R/W	Word	REM	Activation remote operation *
0x0501	R/W	Word	rOFF	Controller OFF in remote setpoint **
0x0502	R/W	Float	rHYS1	Switch-on threshold remote
0x0504	R/W	Float	rHYS2	Switch-off threshold down remote
0x0506	R/W	Float	rHYS3	Switch-off threshold up remote
0x0508	R/W	Float	SPr	Setpoint remote
0x050A	R/W	Word	RK1	Burner release remote operation
0x050B	R/W	Word	RK2	Relay K2 remote operation
0x050C	R/W	Word	RK3	Relay K3 remote operation
0x050D	R/W	Word	RK6	Relay K6 remote operation
0x050E	R/W	Word	rStEP	Step-by-step control remote operation
0x050F	R/W	Float	rY	Angular positioning output remote operation
0x0511	R/W	Float	rHYS4	Switch-on threshold remote (cooling)
0x0513	R/W	Float	rHYS5	Switch-off threshold down remote (cooling)
0x0515	R/W	Float	rHYS6	Switch-off threshold up remote (cooling)

Legend

* = Local

** = Controller OFF

# Dati dell'apparecchio

Address	Access	Data type	Signal reference	Parameter
0x8000	R/O	Char12		Software version
0x8006	R/0	Char14		VdN number

# Stato dell'apparecchio

Address	Access	Data type	Signal reference	Parameter
0x0200	R/O	Word		Outputs and states
			Bit 0	Output 1
			Bit 1	Output 3
			Bit 2	Output 2
			Bit 3	Output 4
			Bit 8	Hysteresis limitation
			Bit 9	Control system
			Bit 10	Self-optimization
			Bit 11	Second setpoint
			Bit 12	Measuring range overshoot InP1
			Bit 13	Measuring range overshoot InP2
			Bit 14	Measuring range overshoot InP3
			Bit 15	Calibration mode
0x0201	R/O	Word		Binary signals and hardware detection
			Bit 0	Operation mode 2-stage
			Bit 1	Manual mode
			Bit 2	Binary input D1
			Bit 3	Binary input D2
			Bit 4	Thermostat function
			Bit 5	First controller output
			Bit 6	Second controller output
			Bit 7	Alarm relay
			Bit 13	Analog output available
			Bit 14	Interface available

#### **Electric connections :**



# Corrispondences bornes entre RWF55.5x y RWF40.0x0Matches terminals betweenRWF55.5x and RWF40.0x0

0	ка	SIEM K2 Ø	ENS   k3 Ø	RWF5 ™ Ø	5.5x 1P Ø	Ø	N Ø		13 Ø	G- ∅	G+ ∅	14 Ø	12 Ø	11 Ø	
	Q	SIEM Y1 Ø	ENS   y2 Ø	RWF4 a13 Ø	0.0xx Q14 Ø	L1	N Ø	pe Ø	U1	G-	G+ ∅	M1	VII Ø	G1+ ∅	

i arameters summarising		1 33.77	•												
			Con	F			ConF								
Navigation menù			Inp												
			Inp	1		Cı	ntr	diSP				F	PArA		Opr
Types of probe	SEn1	OFF1	SCL	SCH	Unit	SPL	SPH	dECP	Pb. 1	dt	rt	tt	HYS1 (*)	HYS3 (*)	SP1 (*)
Siemens QAE2120	6	0	needless	needless	1	30	95	1	10	80	350	(#)	-5	5	80 °C
Siemens QAM2120	6	0	needless	needless	1	0	80	1	10	80	350	(#)	-2,5	2,5	40°C
Pt1000 (130°C max.)	4	0	needless	needless	1	30	95	1	10	80	350	(#)	-5	5	80°C
Pt1000 (350°C max.)	4	0	needless	needless	1	0	350	1	10	80	350	(#)	-5	10	80°C
Pt100 (130°C max.)	1	0	needless	needless	1	0	95	1	10	80	350	(#)	-5	5	80°C
Pt100 (350°C max)	1	0	needless	needless	1	0	350	1	10	80	350	(#)	-5	10	80°C
Probe4÷20mA / 0÷1,6bar	16	0	0	160	needless	0	160	0	5	20	80	(#)	0	20	100 kPa
Probe4÷20mA / 0÷3bar	16	0	0	300	needless	0	300	0	5	20	80	(#)	0	20	200 kPa
Probe 4÷20mA / 0÷10bar	16	0	0	1000	needless	0	1000	0	5	20	80	(#)	0	50	600 kPa
Probe 4÷20mA / 0÷16bar	16	0	0	1600	needless	0	1600	0	5	20	80	(#)	0	80	600 kPa
Probe 4÷20mA / 0÷25bar	16	0	0	2500	needless	0	2500	0	5	20	80	(#)	0	125	600 kPa
Probe 4÷20mA / 0÷40bar	16	0	0	4000	needless	0	4000	0	5	20	80	(#)	0	200	600 kPa
Probe 4+20mA / 0+60PSI	16	0	0	600	needless	0	600	0	5	20	80	(#)	0	30	300 (30PSI)
Probe4÷20mA / 0÷200PSI	16	0	0	2000	needless	0	2000	0	5	20	80	(#)	0	75	600 (60PSI)
Probe4÷20mA / 0÷300PSI	16	0	0	3000	needless	0	3000	0	5	20	80	(#)	0	120	600 (60PSI)
Siemens QBE2002 P4	17	0	0	400	needless	0	400	0	5	20	80	(#)	0	20	200 kPa
Siemens QBE2002 P10	17	0	0	1000	needless	0	1000	0	5	20	80	(#)	0	50	600 kPa
Siemens QBE2002 P16	17	0	0	1600	needless	0	1600	0	5	20	80	(#)	0	80	600 kPa
Siemens QBE2002 P25	17	0	0	2500	needless	0	2500	0	5	20	80	(#)	0	125	600 kPa
Siemens QBE2002 P40	17	0	0	4000	needless	0	4000	0	5	20	80	(#)	0	200	600 kPa
Signal 0÷10V	17	0	needless	needless	needless	needless	needless	needless	5	20	80	(#)			
Signal 4÷20mA	16	0	needless	needless	needless	needless	needless	needless	5	20	80	(#)			

# Parameters summarising for RWF55.xx :

#### NOTE:

(#) tt - servo control run time

SQL33 ; STM30; SQM10; SQM40; SQM50; SQM54 = 30 (secondi) - STA12B3.41; SQN30.251; SQN72.4A4A20 = 12 (secondi) (*)These values are factory set - values must be set during operation at the plant based on the real working temperature/pressure value.

#### WARNING :

With pressure probes in bar the parameters SP1, SCH, SCL, HYS1, HYS3 must be set and displayed in kPa (kilo Pascal); 1bar = 100,000Pa = 100kPa. With pressure probes in PSI the parameters SP1, SCH, SCL, HYS1, HYS3 must be set and displayed in PSI x10 (example: 150PSI > I display 1500).

#### APPENDIX: PROBES CONNECTION

To assure the utmost comfort, the control system needs reliable information, which can be obtained provided the sensors have been installed correctly. Sensors measure and transmit all variations encountered at their location.

Measurement is taken based on design features (time constant) and according to specific operating conditions. With wiring run in raceways, the sheath (or pipe) containing the wires must be plugged at the sensor's terminal board so that currents of air cannot affect the sensor's measurements.

#### Ambient probes (or ambient thermostats)

#### Installation

The sensors (or room thermostats) must be located in reference rooms in a position where they can take real temperature measurements without being affected by foreign factors.



#### It's good to be admired ...even better to be effective

Heating systems: the room sensor must not be installed in rooms with heating units complete with thermostatic valves. Avoid all sources of heat foreign to the system.





Outside probes (weather)Installation

In heating or air-conditioning systems featuring adjustment in response to outside temperature, the sensor's positioning is of paramount importance.





#### Location

On an inner wall on the other side of the room to heating unitsheight above floor 1.5 m, at least 1.5 m away from external sources of heat (or cold).



#### Installation position to be avoided

near shelving or alcoves and recesses, near doors or win-dows, inside outer walls exposed to solar radiation or currents of cold air, on inner walls with heating system pipes, domestic hot water pipes, or cooling system pipes running through them.



Avoid installing near windows, vents, outside the boiler room, on chimney breasts or where they are protected by balconies, cantilever roofs

The sensor must not be painted (measurement error) .

#### Duct or pipe sensors Installing temperature sensors

For measuring outlet air:

"after delivery fan or

"after coil to be controlled, at a distance of at least 0,5 m For measuring room temperature:

"before return air intake fan and near room's return airintake. For measuring saturation temperature: after mist eliminator.



#### Installing pressure sensors

- A installation on ducts carrying fluids at max. temperature 80°C
- B installation on ducts at temperature over 80°C and for refrigerants
- C installation on ducts at high temperatures :
  - · "increase length of siphon

"place sensor at side to prevent it being hit by hot air coming from the pipe.



Bend 0.4m sensor by hand (never use tools) as illustrated .



Use whole cross-section of duct, min. distance from walls 50 mm, radius of curvature 10 mm for 2m or 6m sensors

#### Installing combined humidity sensors

As max. humidity limit sensor on outlet (steam humidifiers) .



#### Installing differential pressure sensors for water

Installation with casing facing down not allowed.

With temperature over 80°C, siphons are needed.

To avoid damaging the sensor, you must comply with the following instructions :

when installing: make sure pressure difference is not greater than the value permitted by the sensor

when there are high static pressures, make sure you insert shutoff valves A-B-C.

#### Putting into operation

Start disable 1=open C1=open C 2=open A2=close B 3=open B3=close A 4= close C



#### Immersion or strap-on sensors



Placing the probes (QAD22.../QAE21.../QAP21.../RCA...)

With pumps on outlet

with 3 ways valves / with 4 ways valves



with 3 ways valves / with 4 ways valves





#### Immersion probes installation

Sensors must be installed on the stretch of pipe in which fluid circulates all the time.

The rigid stem (sensing element doing the measuring) must be inserted by at least 75mm and must face the direction of flow.

Recommended locations: on a bend or on a straight stretch of pipe but tilted by  $45^\circ$  and against the flow of fluid.

Protect them to prevent water from infiltrating (dripping gates, condensation from pipes etc.) .

#### Installing QAD2.. strap-on sensors

Make sure fluid is circulating in the chosen location. Eliminate insulation and paintwork (including rust inhibitor) on a min. 100mm length of pipe.

Sensors come with straps for pipes up to 100 mm in diameter .

# Strap-on or immersion sensors? QAD2.. strap-on sensors

Advantages :

- 10 sec. time constant
- Installed with system running (no plumbing work)
- Installation can be changed easily if it proves incorrect
- ΠLimits:
- Suitable for pipe diameters max. 100 mm
- Can be affected by currents of air etc.

#### QAE2... immersion sensors

Advantages:

- Measure "mean" fluid temperature
- No external influence on measurement such as: currents of air, nearby pipes etc.

Limits:

- Time constant with sheath: 20 sec.
- Hard to change installation position if it proves incorrect

#### Duct pressure switches and sensors

#### Installing differential pressure probes for air



A - Control a filter (clogging)



B - Control a fan (upstream/downstream)



C - Measurement of difference in pressure between two ducts



D - Measurement of difference in pressure between two rooms or of inside of duct and outside

# Basic principles

Measuring static pressure(i.e. pressure exerted by air on pipe walls)



#### Measuring dinamic pressure



#### Legend

- y Kg/m3, specific weight of air
- q m/s, air speed
- g 9.81 m/s2 gravity acceleration
- Pd mm C.A., dynamic pressure

Measuring total pressure



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

# RWF55.5X & RWF55.6X



User manual



Drilling dimensions:



2



### NAVIGATION MENU



RWF55 is preset good for 90% of applications. However, you can set or edit parameters as follow:

# Set-point: set or modification:

When the burner is in stand-by, (safety loop open, that is terminals 3-4/T1-T2 on the 7 pole plug open) push the Enter button: on the lower display (green) Opr appears; push Enter again and in the same display SP1 appears. Push Enter again and the lower display (green SP1) flashes. Using the up and down arrows change the set-point on the upper display (red).Push Enter to confirm and push ESC more times to get the home position.

# PID parameters set and modifications (PArA):

Push Enter button, on the green display **Opr** appears; using the **down arrow**, scroll until group **PArA** is reached and push Enter. On the green display **Pb1** e appears and on the red one the set parameter. Push is sequence the **down or up** arrow the menu is scrolled. Push Enter to select and the **arrows** to choose the desired value. Enter to confirm

Parameter	Display	Range	Factory setting	Remarks
Proportional band	Pb1	1 9999 digit	10	Typical value for temperature
erivative action	dt	0 9999 sec.	80	Typical value for temperature
Integral action	rt	0 9999 sec.	350	Typical value for temperatureT
Dead band(*)	db	0… 999,9 digit	1	Typical value
Servocontrol running time	tt	10 3000 sec.	15	Set servocontrol running time
Switch-on differential(*)	HYS1	0,01999 digit	-5	Value under setpoint below which the burner switches back on (1N-1P closes)
Switch-off differential 2° stage (*)	HYS2	0,0 HYS3	3	(enable only with parameter bin1 = 4)
Upper switch-off differential (*)	HYS3	0,0 9999 digit	5	Value over setpoint above which the burner switches off (1N-1P opens)
Switch-on differential on cooling controller (*)	HYS4	0,0… 9999 digit	5	Do not used (enable only with parameter <b>CACt</b> = 0)
Switch-off differential 2° stage on cooling controller (*)	HYS5	HYS60,0 digit	5	Do not used (enable only with parameter <b>CACt</b> = 0 and parame- ter <b>bin1</b> =0)
Upper switch-off differential on cooling controller (*)	HYS6	0,01999 digit	5	Do not used (enable only with parameter CACt = 0)
Delay modulation	q	0,0… 999,9 digit	0	Do not alter
T Outside temperature Curve point 1 (*)	At1	-40120 digit	-10	First point of external temperature for climatic curve
Boiler temperature Curve point 1 (*)	Ht1	SPLSPH	60	Set-point temperature for the external temperature 1
TT Outside temperature Curve point 2(*)	At2	-40120 digit	20	Second point of external temperature for climatic curve
Boiler temperature Curve point 2 (*)	Ht2	SPLSPH	50	Set-point temperature for the external temperature 2

(*) Parameters affected by setting of decimal place (ConF > dISP parameter dECP)

### Setting the kind of sensor to be connected to the device:

Push the **Enter** button: on the lower display (green) **Opr** appears. Using the **up and down arrows** find **ConF.** Push **Enter** to confirm. Now on the green display the group **InP** appears. Push **Enter** and **InP1** is displaied. Enter to confirm. You are inside **InP1**; the green display shows **Sen1** (sensor type), while the red display shows the chosen sensor code Push **Enter** to enter the **Sen1** parameter, then choose the desired sensor using the **arrows**. Push **Enter** to confirm and **ESC** to escape.

Once selected the sensor, you can modify all the other parameters using up and down arrows according to the tables here below :

#### ConF > InP >InP1

Parameter	Value	Description						
SEn1	1	Pt100 3 wire						
type of sensor for analog	2	Pt100 2 wire						
input 1	3	Pt1000 3 wire						
1	4	Pt1000 2 wire						
	5	Ni1000 3 wire						
	6	Ni1000 2 wire						
	7	0 ÷ 135 ohm						
	8	Cu-CuNi T						
	9	Fe-CuNi J						
	10	NiCr-Ni K						
	11	NiCrSi-NiSi N						
	12	Pt10Rh-Pt S						
	13	Pt13Rh-Pt R						
	14	Pt30Rh-Pt6Rh B						
	15	0 ÷ 20mA						
	16	4 ÷ 20mA						
	17	0 ÷ 10V						
	18	0 ÷ 5V						
	19	1 ÷ 5V						
OFF1	-1999 <b>0</b> +9999	Correction value measured by the sensor						
Sensor offset								
SCL1	-1999 <b>0</b> +9999	minimum scale value(for input ohm, mA, V)						
scale low level								
SCH1	-1999 <b>100</b> +9999	maximum scale value(for input ohm, mA, V)						
scale high level								
dF1	0 <b>0,6</b> 100	Is used to adapt the digital 2nd order input filter (time in s; 0 s = filter off)						
digital filter								
Unit	1	1 = <b>degrees</b> Celsius						
	2	2 = degrees Fahrenheit						
temperature unit								

# ConF > InP > InP2

Input 2 : this input can be used to specify an external setpoint or carry out setpoint shifting

Parameter	Value	Description
FnC2	0	0= no function
	1	1= external setpoint (display <b>SPE</b> )
	2	2 =setpoint shifting (display <b>dSP</b> )
	3	3 = angular positioning feedback
SEn2	1	0 ÷ 20mA
tisensor type input 2	2	4 ÷ 20mA
	3	0 ÷ 10V
	4	0 ÷ 5V
	5	1 ÷ 5V
	1	0 ÷ 20mA
OFF2	-1999 <b>0</b> +9999	Correction value measured by the sensor
Sensor offset		
SCL2	-1999 <b>0</b> +9999	minimum scale value(for input ohm, mA, V)
scale low level		
SCH2	-1999 <b>100</b> +9999	maximum scale value(for input ohm, mA, V)
scale high level		
dF2	0 <b>2</b> 100	Is used to adapt the digital 2nd order input filter (time in s; 0 s = filter off)
digital filter		

(**bold** = factory settings)

# ConF > InP >InP3

Input 3: this input is used to acquire the outside temperature

Parameter	Value	Description
SEn3	0	0 =
sensor type input 3sensor	1	1 = wire
type input 2	2	2 = wire
OFF3	-1999 <b>0</b> +9999	Correction value measured by the sensor
Sensor offset		
dF3	0 <b>1278</b> 1500	Is used to adapt the digital 2nd order input filter (time in s; 0 s = filter off)
digital filter		

# ConF > Cntr

Here, the type of controller, operating action, setpoint limits and presettings for self-optimization are selected

Parameter	Value	Description
CtYP	1	1 = 3-position controller (open-stop-close)
controller type	2	2 = continuative action controller (0 ÷10V or 4 ÷ 20mA)
CACt	1	1 = heating controller
control action	0	0 = cooling controller
SPL	-1999 <b>0</b> +9999	minimum set-point scale
least value of the set-point range		
SPH	-1999 <b>100</b> +999	maximum set-point scale
maximum value of the set- point range		
	0	0 = Free
Self-optimization	1	1 = Locked
		Self-optimization can only be disabled or enabled via the ACS411 setup program.
		Self-optimization is also disabled when the parameter level is locked
oLLo	<b>-1999</b> +9999	lower working range limit
set-point limitation start, operation limit low		
oLHi	-1999 <b>+9999</b>	upper working range limit
set-point limitation end, operation limit high		

(bold = factory settings)

# ConF > rAFC

Activation boiler shock termic protetion:

RWF55.. can activate the thermal shock protection only on sites where the set-point is lower than 250°C and according to **rAL** parameter

Parameter	Value	Description
FnCT		tchoose type of range degrees/time
type of contol	0	0 = deactived
	1	1 = Kelvin degrees/minute
	2	2 = Kelvin degrees/hour
rASL		Slope of thermal shock protection (only with functions 1 and 2)
ramp rate	<b>0,0</b> 999,9	
toLP	<b>2 x (HYS1) = 10</b> 9999	width of tolerance band (in K) about the set-point
tolerance band ramp		0 = tolerance band inactive
rAL ramp limit	<b>0</b> 250	Ramp limit. When this value is lower than the temperature set-point, the RWF controls the output increasing the temp set point step by step accor-
		ding to <b>rASL</b> . If this is over the temp set point, the control is performed in cooling

# Alarm functionAF

The alarm function can be used to monitor the analog inputs. If the limit value is exceeded, multifunctional relay K6 (terminals **6N** and **6P**) is activated (depending on the switching characteristic)

The alarm function can have different switching functions (lk1 to lk8) and can be set to a deviation from the active setpoint or to a fixed limit value

Limit value AL relative to setpoint (x)



Fixed limit value AL



# ConF > AF

Parameter	Value	Description
FnCt	0	0 = Without function
type of control	1	k1 = monitored input InP1
	2	lk2 = monitored input InP1
	3	k3 = monitored input InP1
	4	k4 = monitored input InP1
	5	k5 = monitored input InP1
	6	k6 = monitored input InP1
	/	k7 = monitored input InP1
	0 0	k8 = monitored input InP1
	9 10	lk7 = monitored input InP2
	10	lk8 = monitored input InP2
	12	lk7 = monitored input InP3
		lk8 = monitored input InP3
Alarm value	-1999	Limit value or deviation from setpoint to be monitored (see alarm functions
AL	0	<b>Ik1</b> to <b>Ik8</b> : limit value <b>AL</b> )
	1999	Limit value range for <b>lk1</b> and <b>lk2</b> 09999
HySt	0	Switching differential for limit value AL
switching differential	1	
	9999	
ACrA	0	Switched-off
response by out of range	1	ON
		Switching state in the case of measuring range overshoot or undershoot (Out of Range)

(bold = factory settings)

# ConF > OutP

For fuel-air ratio control purposes, the RWF55 has the binary outputs K2, K3 (terminals KQ,K2, K3) and the analog output (terminals A+, A-). The burner is released via relay K1 (terminals 1N, 1P).

The binary outputs of the RWF55 offer no setting choices

The RWF55 has an analog output.

The analog output offers the following setting choices:

Parameter	Value	Description
FnCt	1	1 = analog input 1 doubling with possibility to convert
type of control	2	2 = analog input 2 doubling with possibility to convert
	3	3 = analog input 3 doubling with possibility to convert
	4	4 = Controller's angular positioning is delivered (modulating controller)
SiGn		physical output signal (terminals A+, A-)
type of output signal	0	0 = 0÷20mA
	1	1 = 4÷20mA
	2	2 = 0÷10V DC
rOut	<b>0</b> 101	signal (in percent) when measurement range is crossed
value when out of input		
range		
oPnt	-1999 <b>0</b> +9999	A value range of the output variable is assigned to a physical output signal (for
zero point		FnCt = 1, 2, 3)
End	-1999 <b>100</b> +9999	A value range of the output variable is assigned to a physical output signal (for
end point		<b>FnCt =</b> 1, 2, 3)

# ConF > binF

This setting decides on the use of the binary inputs**D1**, **D2**, **DG** b

Parameter	Value	Description
bin1	0	0 = without function
binary imput 1 (terminals DG	1	1 = set-point changeover (SP1 / SP2)
– D1)	2	2 = lset-point shift (Opr > dSP parameter = value of set-point modify)
	3	β = input alarm
bin2	4	changeover of operating mode
binary imput 2 (terminalsκ		DG-D2 open = modulating operation
DG – D2)		DG-D2 close = 2 stage operation

(bold = factory settings)

# ConF > dISP

.Both displays can be customized to suit your needs by configuring the displayed value, decimal, time out and blocking

Parameter	Value	Description
diSU		Display value for upper display:
pper display (red)	0	0 = display power-off
	1	1 = analog input 1 (InP1) value
	2	2 = analog input 2 (InP2) value
	3	3 = analog input 3 (InP3) value
	4	4 = controller's angular positioning
	7	6 = set-point valueв
	,	7 = end value with thermal shock protection
diSL		Display value for lower display3:
lower display (green)	0	0 = display power-off
	1	1 = analog input 2 (InP2) value
	2	2 = analog input 2 (InP2) value
	3	3 = analog input 2 (InP2) value
	4 c	4 = controller's angular positioning
	<b>0</b> 7	6 = set-point valueв
	,	7 = end value with thermal shock protection
tout	0 <b>180</b> 250	time (s) on completion of which the controller returns automatically to the
timeout		basic display, if no button is pressed
dECP	0	0 = no decimal place
decimal point	1	1 = one decimal place
	2	2 = two decimal place
CodE	0	0 = no lockout
level lockout	1	1 = configuration level lockout (ConF)
	2	2 = parameter and configuration level lockout (PArA & ConF)
	3	3 = keyboard lockout

# ConF > IntF

The controller can be integrated into a data network using an optional RS-485 (terminals R+ and R-) interface or an optional Profibus DP interface(<u>only model</u>RWF55.6x_terminalsC1-C2-C3-C4)

Parameter	Value	Description
bdrt	0	0 = 4800 baud
baudrate	1	1 = 9600 baud
	2	2 = 19200 baud
	3	3 = 38400 baud
Adr	0	Address in the data network
Device address Modbus	1	
	254	
dP	0 <b>125</b>	only withRWF55.6x
Device address Profibus		
dtt	0	0 = swiched-off
Remote detection time	30	
	7200s	

(**bold** = factory settings)

# Manual control :

In order to manual change the burner load, while firing keep pushing the **ESC** button for more than 5 s; on the lower green display **Hand** appears.

using the **UP** and **DOWN** arrows, the load varies.

Keep pushing the **ESC** button for getting the normal operation again.

NB: every time the device shuts the burner down (start led switched off - contact 1N-1P open), the manual control is not active.

# Device self-setting (auto-tuning):

If the burner in the steady state does not respond properly to heat generator requests, you can activate the Device's self-setting function, which recalculates PID values for its operation, deciding which are most suitable for the specific kind of request

SIEMENS						
		2	6			
<del>П</del>		Ŀ				
	$\bigtriangledown$		С	<mark>K6</mark>	J	

Follow the below instructions:

push the **UP** and **DOWN** arrows for more than 5 s; on the green lower display **tUnE** appears. Now the device pushes the burner to increase and decrease its output. During this time, the device calculates **PID** parameters (**Pb1**, **dt** and **rt**). After the calculations, the **tUnE** is automatically deactivated and the device has already stored them.

In order to stop the Auto-tuning function while it works, push again the **UP** and **DOWN** arrows for more than 5 s. The calculated **PID** parameters can be manually modified following the previously described instructions.

# Display of software version :

The software version is shown by pushing Enter + UP arrow on the upper display.



# Weather-compensated setpoint shifting(climatic regulation):

The RWF55 can be configured so that weather-compensated setpoint shifting is activated when an LG-Ni1000 outside sensor or a Pt1000 is connected (see parameter **InP3**).

To take into account the time response of a building, weather-compensated setpoint shifting uses the attenuated outside temperature rather than the current outside temperature

The minimum and maximum setpoints can be set using the lower setpoint limit **SPL** and the upper setpoint limit **SPH** of the menù **Crtr**. The system also prevents the lower working range limit **oLLo** and upper working range limit **oLHi** from exceeding/dropping below the system temperature limits.

The heating curve describes the relationship between the boiler temperature setpoint and the outside temperature. It is defined by 2 curve points. For 2 outside temperatures, the user defines the boiler temperature setpoint that is required in each case. The heating curve for the weather-compensated setpoint is calculated on this basis. The effective boiler temperature setpoint is limited by the upper setpoint limit **SPH** and the lower setpoint limit **SPL**.



For setting climatic regulation function set:

PArA > parametersAt1, Ht1, At2, Ht2

ConF > InP > InP3 parametersSEn3, FnC3 = 1 (Weather-compensated setpoint).

# Modbus interface

The tables that follow in this chapter specify the addresses of the readable and writable words that the customer is able to access. The customer may read and/or write the values using SCADA programs, PLCs, or similar.

The entries under Access have the following meanings:

 $\ensuremath{\textbf{R/O}}$  Read Only, value can only be read

R/W Read/Write, value can be read and written

The number of characters specified under Data type in the case of character strings includes the final \0.

Char10 means that the text is up to 9 characters long. The final \0 character is then added to this

# User level

Address	Access	Data type	Signal reference	Parameter
0x0000	R/O	Float	X1	Analog input InP1
0x0002	R/O	Float	X2	Analog input InP2
0x0004	R/O	Float	X3	Analog input InP2
0x0006	R/O	Float	WR	Actual setpoint
0x0008	R/W	Float	SP1	Setpoint 1
0x000A	R/W	Float	SP2 (= dSP)	Setpoint 2
0x1035	R/O	Float		Analog input InP3 (unfiltered)
0x1043	R/O	Float		Actual angular positioning
0x1058	R/O	Word	B1	Burner alarm

#### Parameter level

Address	Access	Data type	Signal reference	Parameter
0x3000	R/W	Float	Pb1	Proportional range 1
0x3004	R/W	Float	dt	Derivative action time
0x3006	R/W	Float	rt	Integral action time
0x300C	R/W	Float	db	Dead band
0x3012	R/W	Word	tt	Controlling element running time
0x3016	R/W	Float	HYS1	Switch-on threshold
0x3018	R/W	Float	HYS2	Switch-off threshold down
0x301A	R/W	Float	HYS3	Switch-off threshold up
0x301C	R/W	Float	HYS4	Switch-on threshold (cooling)
0x301E	R/W	Float	HYS5	Switch-off threshold down (cooling)
0x3020	R/W	Float	HYS6	Switch-off threshold up (cooling)
0x3022	R/W	Float	q	Reaction threshold
0x3080	R/W	Float	At1	Outside temperature 1
0x3082	R/W	Float	Ht2	Boiler temperature 1
0x3084	R/W	Float	At2	Outside temperature 2
0x3086	R/W	Float	Ht2	Boiler temperature 2

# **Configuration level**

Address	Access	Data type	Signal reference	Parameter
0x3426	R/W	Float	SCL1	Start of display input 1
0x3428	R/W	Float	SCH1	End of display input 1
0x3432	R/W	Float	SCL2	Start value input 2
0x3434	R/W	Float	SCH2	End value input 2
0x3486	R/W	Float	SPL	Start of setpoint limitation
0x3488	R/W	Float	SPH	End of setpoint limitation
0x342A	R/W	Float	OFFS1	Offset input E1
0x3436	R/W	Float	OFFS2	Offset input E2
0x343A	R/W	Float	OFFS3	Offset input E3
0x1063	R/W	Word	FnCt	Ramp function
0x1065	R/W	Float	rASL	Ramp slope
0x1067	R/W	Float	toLP	Tolerance band ramp
0x1069	R/W	Float	rAL	Limit value
0x1075	R/W	Float	dtt	Remote Detection Timer
0x1077	R/W	Float	dF1	Filter constant input 1
0x1079	R/W	Float	dF2	Filter constant input 2
0x107B	R/W	Float	dF3	Filter constant input 3
0x107D	R/O	Float	oLLo	Lower working range limit
0x107F	R/O	Float	oLHi	Upper working range limit
0x106D	R/W	Word	FnCt	Alarm relay function
0x106F	R/W	Float	AL	Alarm relay limit value (limit value alarm)
0x1071	R/W	Float	HYSt	Alarm relay hysteresis

# Remote operation

Address	Access	Data type	Signal reference	Parameter
0x0500	R/W	Word	REM	Activation remote operation *
0x0501	R/W	Word	rOFF	Controller OFF in remote setpoint **
0x0502	R/W	Float	rHYS1	Switch-on threshold remote
0x0504	R/W	Float	rHYS2	Switch-off threshold down remote
0x0506	R/W	Float	rHYS3	Switch-off threshold up remote
0x0508	R/W	Float	SPr	Setpoint remote
0x050A	R/W	Word	RK1	Burner release remote operation
0x050B	R/W	Word	RK2	Relay K2 remote operation
0x050C	R/W	Word	RK3	Relay K3 remote operation
0x050D	R/W	Word	RK6	Relay K6 remote operation
0x050E	R/W	Word	rStEP	Step-by-step control remote operation
0x050F	R/W	Float	rY	Angular positioning output remote operation
0x0511	R/W	Float	rHYS4	Switch-on threshold remote (cooling)
0x0513	R/W	Float	rHYS5	Switch-off threshold down remote (cooling)
0x0515	R/W	Float	rHYS6	Switch-off threshold up remote (cooling)

Legend

* = Local

** = Controller OFF
# Dati dell'apparecchio

Address	Access	Data type	Signal reference	Parameter
0x8000	R/O	Char12		Software version
0x8006	R/0	Char14		VdN number

# Stato dell'apparecchio

Address	Access	Data type	Signal reference	Parameter
0x0200	R/O	Word		Outputs and states
			Bit 0	Output 1
			Bit 1	Output 3
			Bit 2	Output 2
			Bit 3	Output 4
			Bit 8	Hysteresis limitation
			Bit 9	Control system
			Bit 10	Self-optimization
			Bit 11	Second setpoint
			Bit 12	Measuring range overshoot InP1
			Bit 13	Measuring range overshoot InP2
			Bit 14	Measuring range overshoot InP3
			Bit 15	Calibration mode
0x0201	R/O	Word		Binary signals and hardware detection
			Bit 0	Operation mode 2-stage
			Bit 1	Manual mode
			Bit 2	Binary input D1
			Bit 3	Binary input D2
			Bit 4	Thermostat function
			Bit 5	First controller output
			Bit 6	Second controller output
			Bit 7	Alarm relay
			Bit 13	Analog output available
			Bit 14	Interface available

# **Electric connections :**



# Corrispondences bornes entre RWF55.5x y RWF40.0x0Matches terminals betweenRWF55.5x and RWF40.0x0

0	ка	SIEM K2 Ø	ENS   k3 Ø	RWF5 ™ Ø	5.5x 1P Ø	Ø	N Ø		13 Ø	G- ∅	G+ ⊘	14 Ø	12 Ø	11 Ø	
	Q	SIEM Y1 Ø	ENS   y2 Ø	RWF4 a13 Ø	0.0xx Q14 Ø	L1	N Ø	pe Ø	U1	G-	G+ ∅	M1	VII Ø	G1+ ∅	

i arameters summarising		1 33.77	•												
			Con	F			ConF								
Navigation menù			Inp												
			Inp1		Cı	Cntr		PArA				Opr			
Types of probe	SEn1	OFF1	SCL	SCH	Unit	SPL	SPH	dECP	Pb. 1	dt	rt	tt	HYS1 (*)	HYS3 (*)	SP1 (*)
Siemens QAE2120	6	0	needless	needless	1	30	95	1	10	80	350	(#)	-5	5	80 °C
Siemens QAM2120	6	0	needless	needless	1	0	80	1	10	80	350	(#)	-2,5	2,5	40°C
Pt1000 (130°C max.)	4	0	needless	needless	1	30	95	1	10	80	350	(#)	-5	5	80°C
Pt1000 (350°C max.)	4	0	needless	needless	1	0	350	1	10	80	350	(#)	-5	10	80°C
Pt100 (130°C max.)	1	0	needless	needless	1	0	95	1	10	80	350	(#)	-5	5	80°C
Pt100 (350°C max)	1	0	needless	needless	1	0	350	1	10	80	350	(#)	-5	10	80°C
Probe4÷20mA / 0÷1,6bar	16	0	0	160	needless	0	160	0	5	20	80	(#)	0	20	100 kPa
Probe4÷20mA / 0÷3bar	16	0	0	300	needless	0	300	0	5	20	80	(#)	0	20	200 kPa
Probe 4÷20mA / 0÷10bar	16	0	0	1000	needless	0	1000	0	5	20	80	(#)	0	50	600 kPa
Probe 4÷20mA / 0÷16bar	16	0	0	1600	needless	0	1600	0	5	20	80	(#)	0	80	600 kPa
Probe 4÷20mA / 0÷25bar	16	0	0	2500	needless	0	2500	0	5	20	80	(#)	0	125	600 kPa
Probe 4÷20mA / 0÷40bar	16	0	0	4000	needless	0	4000	0	5	20	80	(#)	0	200	600 kPa
Probe 4+20mA / 0+60PSI	16	0	0	600	needless	0	600	0	5	20	80	(#)	0	30	300 (30PSI)
Probe4÷20mA / 0÷200PSI	16	0	0	2000	needless	0	2000	0	5	20	80	(#)	0	75	600 (60PSI)
Probe4+20mA / 0+300PSI	16	0	0	3000	needless	0	3000	0	5	20	80	(#)	0	120	600 (60PSI)
Siemens QBE2002 P4	17	0	0	400	needless	0	400	0	5	20	80	(#)	0	20	200 kPa
Siemens QBE2002 P10	17	0	0	1000	needless	0	1000	0	5	20	80	(#)	0	50	600 kPa
Siemens QBE2002 P16	17	0	0	1600	needless	0	1600	0	5	20	80	(#)	0	80	600 kPa
Siemens QBE2002 P25	17	0	0	2500	needless	0	2500	0	5	20	80	(#)	0	125	600 kPa
Siemens QBE2002 P40	17	0	0	4000	needless	0	4000	0	5	20	80	(#)	0	200	600 kPa
Signal 0÷10V	17	0	needless	needless	needless	needless	needless	needless	5	20	80	(#)			
Signal 4÷20mA	16	0	needless	needless	needless	needless	needless	needless	5	20	80	(#)			

# Parameters summarising for RWF55.xx :

# NOTE:

(#) tt - servo control run time

SQL33 ; STM30; SQM10; SQM40; SQM50; SQM54 = 30 (secondi) - STA12B3.41; SQN30.251; SQN72.4A4A20 = 12 (secondi) (*)These values are factory set - values must be set during operation at the plant based on the real working temperature/pressure value.

# WARNING :

With pressure probes in bar the parameters SP1, SCH, SCL, HYS1, HYS3 must be set and displayed in kPa (kilo Pascal); 1bar = 100,000Pa = 100kPa. With pressure probes in PSI the parameters SP1, SCH, SCL, HYS1, HYS3 must be set and displayed in PSI x10 (example: 150PSI > I display 1500).

# APPENDIX: PROBES CONNECTION

To assure the utmost comfort, the control system needs reliable information, which can be obtained provided the sensors have been installed correctly. Sensors measure and transmit all variations encountered at their location.

Measurement is taken based on design features (time constant) and according to specific operating conditions. With wiring run in raceways, the sheath (or pipe) containing the wires must be plugged at the sensor's terminal board so that currents of air cannot affect the sensor's measurements.

#### Ambient probes (or ambient thermostats)

#### Installation

The sensors (or room thermostats) must be located in reference rooms in a position where they can take real temperature measurements without being affected by foreign factors.



#### It's good to be admired ...even better to be effective

Heating systems: the room sensor must not be installed in rooms with heating units complete with thermostatic valves. Avoid all sources of heat foreign to the system.





Outside probes (weather)Installation

In heating or air-conditioning systems featuring adjustment in response to outside temperature, the sensor's positioning is of paramount importance.





#### Location

On an inner wall on the other side of the room to heating unitsheight above floor 1.5 m, at least 1.5 m away from external sources of heat (or cold).



#### Installation position to be avoided

near shelving or alcoves and recesses, near doors or win-dows, inside outer walls exposed to solar radiation or currents of cold air, on inner walls with heating system pipes, domestic hot water pipes, or cooling system pipes running through them.



Avoid installing near windows, vents, outside the boiler room, on chimney breasts or where they are protected by balconies, cantilever roofs

The sensor must not be painted (measurement error) .

# Duct or pipe sensors Installing temperature sensors

For measuring outlet air:

"after delivery fan or

"after coil to be controlled, at a distance of at least 0,5 m For measuring room temperature:

"before return air intake fan and near room's return airintake. For measuring saturation temperature: after mist eliminator.



# Installing pressure sensors

- A installation on ducts carrying fluids at max. temperature 80°C
- B installation on ducts at temperature over 80°C and for refrigerants
- C installation on ducts at high temperatures :
  - · "increase length of siphon

"place sensor at side to prevent it being hit by hot air coming from the pipe.



Bend 0.4m sensor by hand (never use tools) as illustrated .



Use whole cross-section of duct, min. distance from walls 50 mm, radius of curvature 10 mm for 2m or 6m sensors

# Installing combined humidity sensors

As max. humidity limit sensor on outlet (steam humidifiers) .



# Installing differential pressure sensors for water

Installation with casing facing down not allowed.

With temperature over 80°C, siphons are needed.

To avoid damaging the sensor, you must comply with the following instructions :

when installing: make sure pressure difference is not greater than the value permitted by the sensor

when there are high static pressures, make sure you insert shutoff valves A-B-C.

# Putting into operation

Start disable 1=open C1=open C 2=open A2=close B 3=open B3=close A 4= close C



#### Immersion or strap-on sensors



Placing the probes (QAD22.../QAE21.../QAP21.../RCA...)

With pumps on outlet

with 3 ways valves / with 4 ways valves



with 3 ways valves / with 4 ways valves





#### Immersion probes installation

Sensors must be installed on the stretch of pipe in which fluid circulates all the time.

The rigid stem (sensing element doing the measuring) must be inserted by at least 75mm and must face the direction of flow.

Recommended locations: on a bend or on a straight stretch of pipe but tilted by  $45^\circ$  and against the flow of fluid.

Protect them to prevent water from infiltrating (dripping gates, condensation from pipes etc.) .

#### Installing QAD2.. strap-on sensors

Make sure fluid is circulating in the chosen location. Eliminate insulation and paintwork (including rust inhibitor) on a min. 100mm length of pipe.

Sensors come with straps for pipes up to 100 mm in diameter .

# Strap-on or immersion sensors? QAD2.. strap-on sensors

Advantages :

- 10 sec. time constant
- Installed with system running (no plumbing work)
- Installation can be changed easily if it proves incorrect
- ΠLimits:
- Suitable for pipe diameters max. 100 mm
- Can be affected by currents of air etc.

# QAE2... immersion sensors

Advantages:

- Measure "mean" fluid temperature
- No external influence on measurement such as: currents of air, nearby pipes etc.

Limits:

- Time constant with sheath: 20 sec.
- Hard to change installation position if it proves incorrect

#### Duct pressure switches and sensors

# Installing differential pressure probes for air



A - Control a filter (clogging)



B - Control a fan (upstream/downstream)



C - Measurement of difference in pressure between two ducts



D - Measurement of difference in pressure between two rooms or of inside of duct and outside

# Basic principles

Measuring static pressure(i.e. pressure exerted by air on pipe walls)



# Measuring dinamic pressure



#### Legend

- y Kg/m3, specific weight of air
- q m/s, air speed
- g 9.81 m/s2 gravity acceleration
- Pd mm C.A., dynamic pressure

Measuring total pressure



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







0	1	2	3	4	5	6	7		8	9	
	x10-05	+ I X10-06 1 (2)	AIR ACTUATO ACTINITPUT B ACTIOUTPUT B ACTIOUTPUT B ACTIOUTPUT A ACTIOUTPUT A ACTIOUTPUT A ACTIOUTPUT A	n ACT	FUEL ACTUATOR FUEL ACTUATOR B INdIN 010 CMB A INDIN 010 CMB	DISPLAY / BCI DISPLAY / BCI OIX DISPLAY / BCI OIX DISPLAY / BCI OIX DISPLAY / BCI				FREE <u> </u>	
(N5-M (N5-M ER/UV-F- ER/UV-M	(°) ER (°)	$PGMAX-F^{(NS-F}$ $PGMAX-F^{(NS-F)}$ $PGMAX-M^{(NS-F)}$ $PGMAX-M^{(NS-F)}$ $PGMAX-M^{(NS-F)}$ $PGMAX-F^{(NS-F)}$ $ER/UV-F^{(NS-F)}$ $ER/UV-F^{(NS-F)}$ $ER/UV-F^{(NS-F)}$ $ER/UV-F^{(NS-F)}$ $ER/UV-M^{(NS-F)}$	v run v run	SCHERMATURA SHELD	SCMLTT, 2460	AZL2x					
SONDA "UV" IN AL <i>"UV" PROBL</i>	(°) TERNATIVA A ELETTROD E ALTERNATIVE TO "ER"	0 "ER"						Data Revisione Dis. N. <b>(</b>	16/06/2014 02 05 - 1045 A	PREC. - 3 SEGUE 5	FOGLIO 4 TOTALE 11









0	1	2	3	4	5	6	7	8	9
									/

Sigla/Item	Foglio/Sheet	Funzione	Function
600V RRR0-1-T73	5	REGOLATORE MODULANTE (ALTERNATIVO)	BURNER MODULATOR (ALTERNATIVE)
AZL2x	4	INTERFACCIA UTENTE	USER INTERFACE
ER	4	ELETTRODO RILEVAZIONE FIAMMA	FLAME DETECTION ELECTRODE
EV1	3	ELETTROVALVOLA GAS LATO RETE	UPSTREAM GAS SOLENOID VALVE
EV2	3	ELETTROVALVOLA GAS LATO BRUCIATORE	DOWNSTREAM GAS SOLENOID VALVE
EVS	3	ELETTROVALVOLA GAS DI SICUREZZA (OPTIONAL)	SAFETY GAS SOLENOID VALVE (OPTIONAL)
FQ-LED	8	PANNELLO FRONTALE (LED)	FRONT PANEL (LED)
FU1	1	FUSIBILE AUSILIARIO	AUXILIARY FUSE
FU2	5	FUSIBILE	FUSE
FU-A	1	FUSIBILI DI LINEA	LINE FUSES
FU-B	1	FUSIBILE DI LINEA	LINE FUSE
IG	1	INTERRUTTORE GENERALE	MAINS SWITCH
IL	1	INTERRUTTORE LINEA AUSILIARI	AUXILIARY LINE SWITCH
KM3 HCRMMD	5	REGOLATORE MODULANTE (ALTERNATIVO)	BURNER MODULATOR (ALTERNATIVE)
KM-V	2	CONTATTORE MOTORE VENTILATORE	FAN MOTOR CONTACTOR
LB	2	LAMPADA SEGNALAZIONE BLOCCO BRUCIATORE	INDICATOR LIGHT FOR BURNER LOCK-OUT
LEV1	3	LAMPADA SEGNALAZIONE APERTURA [EV1]	INDICATOR LIGHT FOR OPENING OF ELECTRO-VALVE [EV1]
LEV2	3	LAMPADA SEGNALAZIONE APERTURA [EV2]	INDICATOR LIGHT FOR OPENING OF ELECTRO-VALVE [EV2]
LF1	3	LAMPADA SEGNALAZIONE FUNZIONAMENTO BRUCIATORE	INDICATOR LIGHT BURNER OPERATION
LF2	3	LAMPADA SEGNALAZIONE FUNZIONAMENTO BRUCIATORE	INDICATOR LIGHT BURNER OPERATION
LMV20.100	1	APPARECCHIATURA DI COMANDO	CONTROL SCHEME
LPG	2	LAMPADA SEGNALAZIONE PRESENZA GAS IN RETE	INDICATOR LIGHT FOR PRESENCE OF GAS IN THE NETWORK
LT	1	LAMPADA SEGNALAZIONE BLOCCO TERMICO MOTORE VENTILATORE	INDICATOR LIGHT FOR FAN MOTOR OVERLOAD THERMAL CUTOUT
LTA	2	LAMPADA SEGNALAZIONE TRASFORMATORE DI ACCENSIONE	IGNITION TRANSFORMER INDICATOR LIGHT
MB-DLESx0	3	GRUPPO VALVOLE GAS	GAS VALVES GROUP
MB-DLESx2	3	GRUPPO VALVOLE GAS	GAS VALVES GROUP
MBCSEx0	3	GRUPPO VALVOLE GAS (ALTERNATIVO)	GAS VALVES GROUP (ALTERNATIVE)
MBCSEx2	3	GRUPPO VALVOLE GAS (ALTERNATIVO)	GAS VALVES GROUP (ALTERNATIVE)
MV	1	MOTORE VENTILATORE	FAN MOTOR
PA	1	PRESSOSTATO ARIA	AIR PRESSURE SWITCH
PGCP_GAS	3	PRESSOSTATO GAS CONTROLLO PERDITE (OPTIONAL)	GAS LEAKAGE PRESSURE SWITCH (OPTIONAL)
PGMAX	4	PRESSOSTATO GAS DI MASSIMA PRESSIONE (OPTIONAL)	MAXIMUM PRESSURE GAS SWITCH (OPTIONAL)

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Sigla/Item	Foglio/Sheet	Funzione	Function
PGMIN	2	PRESSOSTATO GAS DI MINIMA PRESSIONE	MINIMUM GAS PRESSURE SWITCH
PT100	6	SONDA DI TEMPERATURA	TEMPERATURE PROBE
RWF50.2x	5	REGOLATORE MODULANTE	BURNER MODULATOR
RWF55.5x	5	REGOLATORE MODULANTE (ALTERNATIVO)	BURNER MODULATOR (ALTERNATIVE)
SD-PRESS	6	SONDA DI PRESSIONE	PRESSURE PROBE
SD-TEMP.	6	SONDA DI TEMPERATURA	TEMPERATURE PROBE
SD - 0÷10V	6	TRASDUTTORE USCITA IN TENSIONE	TRANSDUCER VOLTAGE OUTPUT
SD - 4÷20mA	6	TRASDUTTORE USCITA IN CORRENTE	TRANSDUCER CURRENT OUTPUT
SMA	5	SELETTORE MANUALE/AUTOMATICO	MANUAL/AUTOMATIC SWITCH
SMF	5	SELETTORE MANUALE FUNZIONAMENTO MIN-0-MAX	MIN-0-MAX MANUAL OPERATION SWITCH
SQN1/SQM3 AIR	4	SERVOCOMANDO SERRANDA ARIA	AIR DAMPER ACTUATOR
SQN1/SQM3 FUEL	4	SERVOCOMANDO COMBUSTIBILE	FUEL ACTUATOR
ST	2	SERIE TERMOSTATI/PRESSOSTATI	SERIES OF THERMOSTATS OR PRESSURE SWITCHES
ТА	2	TRASFORMATORE DI ACCENSIONE	IGNITION TRANSFORMER
ТАВ	2	TERMOSTATO/PRESSOSTATO ALTA-BASSA FIAMMA	HIGH-LOW THERMOSTAT/PRESSURE SWITCHES
ТС	6	TERMOCOPPIA	THERMOCOUPLE
TV	1	TERMICO MOTORE VENTILATORE	FAN MOTOR THERMAL
UV	4	SONDA UV RILEVAZIONE FIAMMA	UV FLAME DETECTOR

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