KP91
KP92
KP93
KR512
KR515
KR520
KR525

Progressive
and fully-modulating
gas - heavy oil burners

LMV2x
Microprocessor-controlled

MANUAL OF INSTALLATION - USE - MAINTENANCE

CIB UNIGAS

BURNERS - BRUCIATORI - BRULERS - BRENNER - QUEMADORES - ГОРЕЛКИ

M039389CB 0.0 08/2021

DANGERS, WARNINGS AND NOTES OF CAUTION

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

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

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

Carefully keep this manual for future reference.

The following:

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

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

IMPORTANT :

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

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

RISK ANALYSIS

Instruction manual supplied with the burner:

This is an integral and essential part of the product and must not be separated from it. It must therefore be kept carefully for any necessary consultation and must accompany the burner even if it is transferred to another owner or user, or to another system. In the event of damage or loss, another copy must be requested from the local customer service centre;

Delivery of the system and instruction manual

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

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

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

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

WARRANTY AND LIABILITY

In particular, warranty and liability claims will no longer be valid in the event of damage to persons and/or property if such damage is due to any of the following causes:

- Incorrect installation, start-up, use and maintenance of the burner;
- Improper, incorrect or unreasonable use of the burner;
- Operation by unqualified personnel;
- Carrying out of unauthorised changes to the device;
- Use of the burner with safety devices that are faulty, incorrectly applied and/or not working;
- Installation of untested supplementary components on the burner;
- Powering of the burner with unsuitable fuels;
- Faults in the fuel supply system;
- Use of the burner even after an error and/or fault has occurred;
- Repairs and/or overhauls incorrectly carried out;
- Modification of the combustion chamber with inserts that prevent the regular development of the structurally established flame;
- Insufficient and inappropriate supervision and care of the burner components most subject to wear and tear;
- Use of non-original components, whether spare parts, kits, accessories and optionals;
- Force majeure.

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



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

Personnel training

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

The user:

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

GENERAL INTRODUCTION

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

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

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

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

Contact qualified personnel only.

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

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

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

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

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

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

The manufacturer shall not be held liable, by agreement or otherwise, for WARNING! Failure to observe the information given in this manual, operating negligence, incorrect installation and carrying out of non authorised modifications will result in the annulment by the manufacturer of the guarantee that it supplies with the burner.

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

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

SPECIAL INSTRUCTIONS FOR BURNERS

a Make the following checks:

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

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

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

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

Special warnings

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

GENERAL INSTRUCTIONS DEPENDING ON FUEL USED

ELECTRICAL CONNECTION

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

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

FIRING WITH GAS, LIGHT OIL OR OTHER FUELS GENERAL

General Warnings

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

Special instructions for using gas

Have qualified personnel inspect the installation to ensure that:

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

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

BURER DATA PLATE

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

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

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

Precautions if you can smell gas

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

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

c close the gas valves;

d contact qualified personnel.

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

Using oil pressure gauges

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

SYMBOLS USED

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

BURNER SAFETY

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

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

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

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

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

Do not use fuels other than the ones stated.

Do not use the burner in potentially explosive environments.

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

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

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

Untrained staff must not modify any linkages.

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

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

Safety and prevention

- Opening or tampering with the burner components is not allowed, apart from the parts requiring maintenance.
- Only those parts envisaged by the manufacturer can be replaced.

DIRECTIVES AND STANDARDS

Gas - Heavy oil burners

European directives

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

Harmonized standards

UNI EN 676 (Automatic forced draught burners for gaseous fuels)
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);
UNI EN ISO 12100:2010 (Safety of machinery - General principles for design - Risk assessment and risk reduction);

Industrial burners

European directives

2006/42/CE (Machinery Directive)
2014/35/UE (Low Tension Directive)
2014/30/UE (Electromagnetic compatibility Directive)
2006/42/CE (Machinery Directive)

Harmonized standards

EN 746-2 (Industrial thermoprocessing equipment - Part 2: Safety requirements for combustion and fuel handling systems)
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);
UNI EN ISO 12100:2010 (Safety of machinery - General principles for design - Risk assessment and risk reduction);

PART I: SPECIFICATIONS

BURNER FEATURES

Burner model identification

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

Type	**KR512**	Model	**MN.**	**MD.**	**S.**	**.**	**A.**	**1.**	**60**	**EC**
	(1)		**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**

(1) BURNER TYPE	**KP91 - KP92 - KP93 - KR512 - KR515 - KR520 - KR525**
(2) FUEL	M - Natural gas L - LPG B - Biogas N - Heavy oil, viscosity <= 50cSt (7° E) @ 50° C E - Heavy oil, viscosity <= 110cSt (15°E) @ 50° C D - Heavy oil, viscosity <= 400cSt (50° E) @ 50° C P - Petroleum, viscosity 89cSt (12° E) @ 50° C
(3) OPERATION (Available versions)	PR - Progressive MD - Fully modulating
(4) BLAST TUBE	S - Standard L - Extended
(5) DESTINATION COUNTRY	* - see data plate
(6) BURNER VERSION	A - Standard
(7) EQUIPMENT	1 = 2 valves + gas proving system 8 = 2 valves + gas proving system + high gas pressure switch
(8) GAS CONNECTION (see Specifications)	50 = Rp2 65 = DN65 80 = DN80 100 = DN100
(9) MICRO-PROCESSOR CONTROL	EC = micro-processor control, without inverter ED = micro-processor control, with inverter

Fuel

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

Type	--
Model	--
Year	--
S.Number	--
Output	--
Oil Flow	
Fuel	--
Category	--
Gas Pressure	--
Viscosity	--
El.Supply	--
El.Consump.	--

BURNERS		KP91	KP92	KP93	KP93 L-
Output	min. - max. kW	480 - 2670	480-3050	550 - 4100	
Fuel		Natural gasHeavy oil			LP
Category		(see next paragraph)			$I_{3B/P}$
Gas rate (Natural gas)	min. - max. (Stm^3/h)	51 - 283	51 - 323	58 - 434	21-153
Gas pressure	min. - max. mbar	(Note2)			
Viscosity		See “Burner model identification” table			
Oil train inlet pression	max. bar	4			
Heavy oil rate	min. - max. kg/h	43 - 233	43 - 272	49 - 365	
Power supply		400 V 3N ~ 50 Hz			
Total power consumption (Heavy oil)	kW	23,6	25,1	33,1	33,1
Total power consumption (Petroleum)	kW	11,6	13,1	17,1	17,1
Fan motor	kW	4,0	5,5	7,5	7,5
Pump motor	kW	1,1			
Pre-heater resistors (heavy oil)	kW	18	18	24	24
Pre-heater resistors (Petroleum)	kW	6	6	8	8
Protection		IP40			
Operation		MD - Fully modulating			
Gas Train 50	Valves size / Gas connection	50 / Rp 2”			
Gas Train 65		65 / DN65			
Gas Train 80		80 / DN80			
Gas Train 100		100 / DN100			
Operating temperature	°C	-10 ÷ +50			
Storage temperature	°C	-20 ÷ +60			
Working service*		Intermitent			

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 MJ / Stm^3);**
Note2:	**Maximum gas pressure = 500mbar (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 %**

Heavy oil net calorific value (Hi): 40.4MJ/kg (average value).

(*) NOTE ON THE WORKING SERVICE: the control box automatically stops after 24h of continuous working. The control box immediately starts up, automatically.

BURNERS		KR512	KR515	KR520	KR525
Output	min. - max. kW	600 - 4500	770 - 5200	1000 - 6400	2000 - 8000
Fuel		Natural gasHeavy oil			
Category		(see next paragraph)			
Gas rate (natural gas)	min. - max. (Stm^3/h)	63 - 476	81 - 550	106 - 677	212 - 847
Gas pressure	min. - max. mbar	(Note2)			
Viscosity		See “Burner model identification” table			
Oil train inlet pression	max. bar	4			
Heavy oil rate	min. - max. kg/h	53 - 401	69 - 463	89 - 570	178 - 713
Power supply		400 V 3N ~ 50 Hz			
Total power consumption (Heavy oil)	kW	35,2	43	59,7	69,2
Total power consumption (Petroleum)	kW	19,2	23	31,7	37,2
Fan motor	kW	9,2	11	15	18,5
Pump motor	kW	1,5	1,5	2,2	2,2
Pre-heater resistors (heavy oil)	kW	24	30	42	48
Pre-heater resistors (Petroleum)	kW	8	10	14	16
Protection		IP40			
Operation		MD - Fully modulating			
Gas Train 50	Valves size/ Gas connection	50 / Rp 2”			
Gas Train 65		65 / DN65			
Gas Train 80		80 / DN80			
Gas Train 100		100 / DN100			
Operating temperature	°C	-10 ÷ +50			
Storage temperature	°C	-20 ÷ +60			
Working service*		Intermitent			
noise level (sound power level)(**)		85			

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 MJ / Stm^3);**
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Gas categories and countries of application

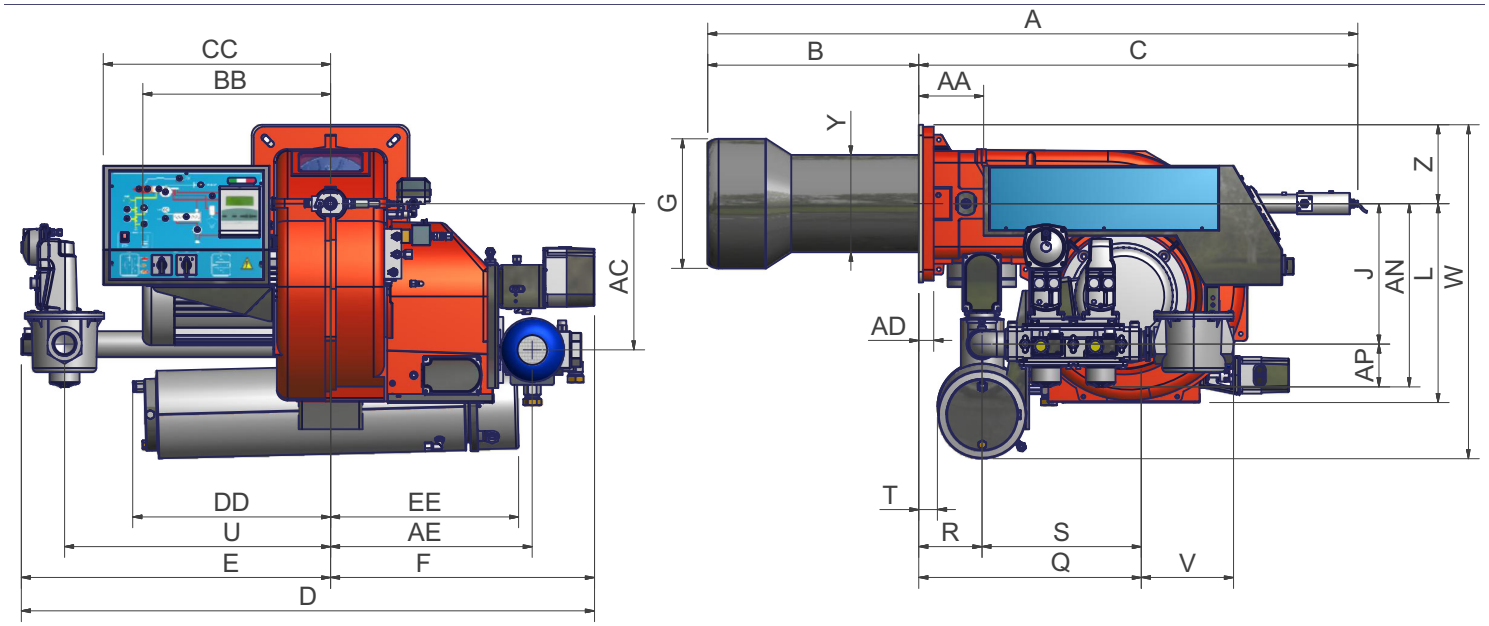
Countries
AL, AT, BE, BG, CH, CY, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MK, MT, NO, NL, PL, PT, RO, SE, SI, SK, TR

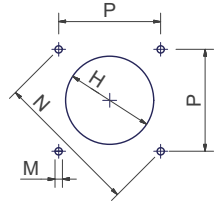
Group	
H	L (*)
E	2R (*)
EK (*)	Er (*)
LL (*)	E (R)

(*) Premix type ...N burners are not enabled to work with these gas categories.

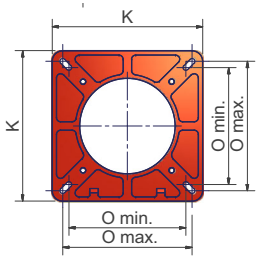
The above gas groups can be combined according to the standard EN437:2021 and national situation of countries.

Overall dimensions (mm) - KP91, KP92, KP93





Boiler recommended drilling template

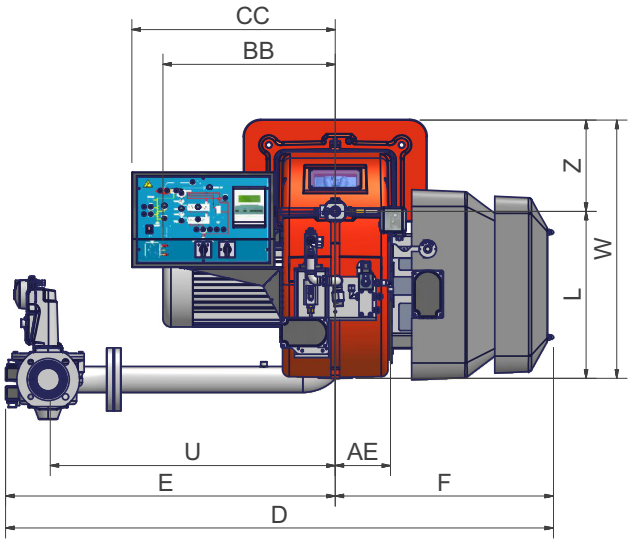


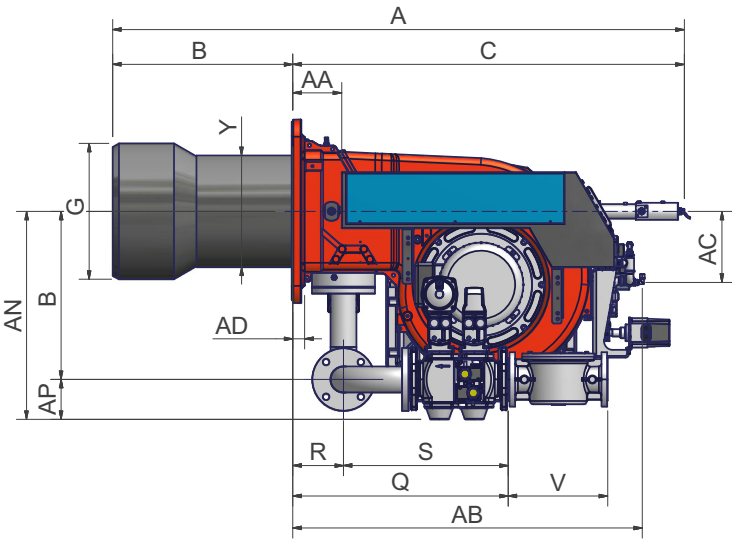
Reccomended burner flange

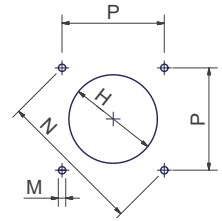
	DN	A	AA	AC	AD	AE	AN	AP	B	BB	C	CC	D	DD	E	EE	F	G	H	I	J	K	L	M	N	Omin	Omax	P	Q	R	S	T	U	V	W	Y	Z
KP91	50	1615	152	343	35	473	429	100	560	441	1055	533	1345	464	726	441	619	304	344	228	329	360	466	M12	424	280	310	300	522	148	374	44	624	216	783	240	185
	65	1615	152	343	35	473	405	117	560	441	1055	533	1494	464	875	441	619	304	344	228	288	360	466	M12	424	280	310	300	632	148	484	44	750	292	783	240	185
	80	1615	152	343	35	473	439	132	560	441	1055	533	1496	464	877	441	619	304	344	228	307	360	466	M12	424	280	310	300	683	148	535	44	750	313	783	240	185
	100	1615	152	343	35	473	592	145	560	441	1055	533	1586	464	967	441	619	304	344	228	447	360	466	M12	424	280	310	300	790	148	642	44	824	353	783	240	185
KP92	50	1615	152	343	35	473	429	100	560	441	1055	533	1345	464	726	441	619	304	344	228	329	360	466	M12	424	280	310	300	522	148	374	44	624	216	783	240	185
	65	1615	152	343	35	473	405	117	560	441	1055	533	1494	464	875	441	619	304	344	228	288	360	466	M12	424	280	310	300	632	148	484	44	750	292	783	240	185
	80	1615	152	343	35	473	439	132	560	441	1055	533	1496	464	877	441	619	304	344	228	307	360	466	M12	424	280	310	300	683	148	535	44	750	313	783	240	185
	100	1615	152	343	35	473	592	145	560	441	1055	533	1586	464	967	441	619	304	344	228	447	360	466	M12	424	280	310	300	790	148	642	44	824	353	783	240	185
KP93	50	1550	152	343	35	473	429	100	495	460	1055	533	1345	464	726	441	619	304	344	228	329	360	466	M12	424	280	310	300	522	148	374	44	624	216	783	248	185
	65	1550	152	343	35	473	405	117	495	460	1055	533	1494	464	875	441	619	304	344	228	288	360	466	M12	424	280	310	300	632	148	484	44	750	292	783	248	185
	80	1550	152	343	35	473	439	132	495	460	1055	533	1496	464	877	441	619	304	344	228	307	360	466	M12	424	280	310	300	683	148	535	44	750	313	783	248	185
	100	1550	152	343	35	473	592	145	495	460	1055	533	1586	464	967	441	619	304	344	228	447	360	466	M12	424	280	310	300	790	148	642	44	824	353	783	248	185

*DN = gas valves size

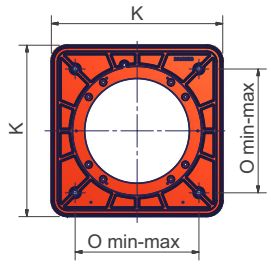
KR512, KR515, KR520







Boiler recommended drilling template

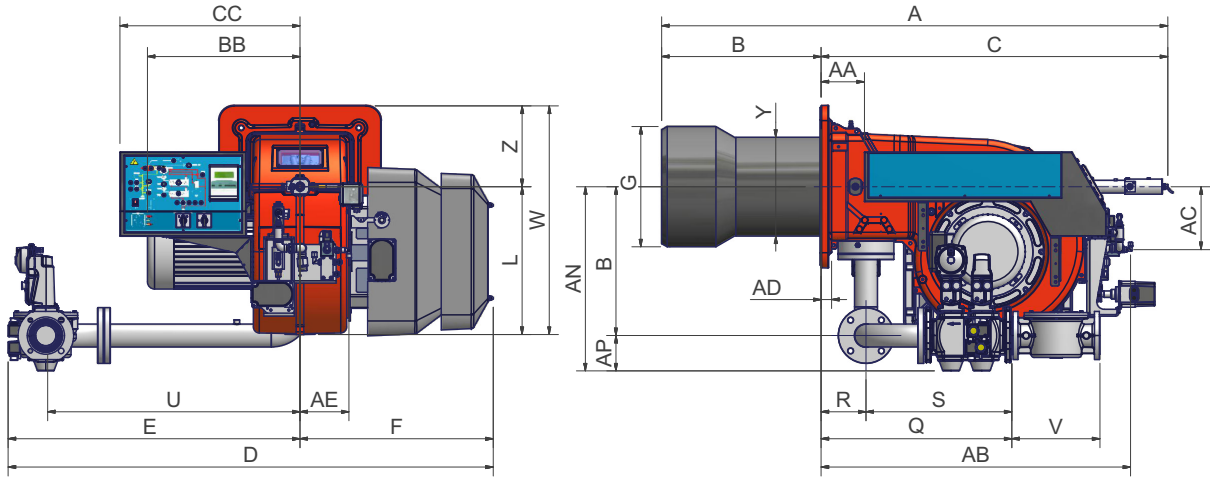


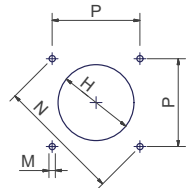
Reccomended burner flange

	DN	A	AA	AD	AN	AP	B	BB	C	CC	D	E	F	G	H	J	K	L	M	N	O	P	Q	R	S	U	V	W	Y	Z
KR512	50	1674	144	35	594	100	555	508	1119	598	1585	943	642	380	420	494	540	492	M14	552	390	390	755	150	605	843	216	759	328	270
	65	1674	144	35	612	118	555	508	1119	598	1609	967	642	380	420	494	540	492	M14	552	390	390	633	150	483	843	292	759	328	270
	80	1674	144	35	626	132	555	508	1119	598	1644	1002	642	380	420	494	540	492	M14	552	390	390	685	150	535	875	322	759	328	270
	100	1674	144	35	639	145	555	508	1119	598	1727	1085	642	380	420	494	540	492	M14	552	390	390	792	150	642	942	382	759	328	270
KR515	50	1676	144	35	594	100	530	508	1146	598	1585	943	642	380	420	494	540	492	M14	552	390	390	755	150	605	843	216	759	328	270
	65	1676	144	35	612	118	530	508	1146	598	1609	967	642	380	420	494	540	492	M14	552	390	390	633	150	483	843	292	759	328	270
	80	1676	144	35	626	132	530	508	1146	598	1644	1002	642	380	420	494	540	492	M14	552	390	390	685	150	535	875	322	759	328	270
	100	1676	144	35	639	145	530	508	1146	598	1727	1085	642	380	420	494	540	492	M14	552	390	390	792	150	642	942	382	759	328	270
KR520	50	1682	144	35	594	100	530	508	1152	598	1585	943	642	434	484	494	540	492	M14	552	390	390	755	150	605	843	216	759	328	270
	65	1682	144	35	612	118	530	508	1152	598	1609	967	642	434	484	494	540	492	M14	552	390	390	633	150	483	843	292	759	328	270
	80	1682	144	35	626	132	530	508	1152	598	1644	1002	642	434	484	494	540	492	M14	552	390	390	685	150	535	875	322	759	328	270
	100	1682	144	35	639	145	530	508	1152	598	1727	1085	642	434	484	494	540	492	M14	552	390	390	792	150	642	942	382	759	328	270

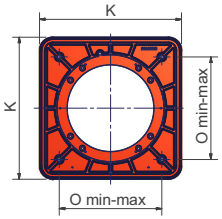
*DN = gas valves size

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Boiler recommended drilling template

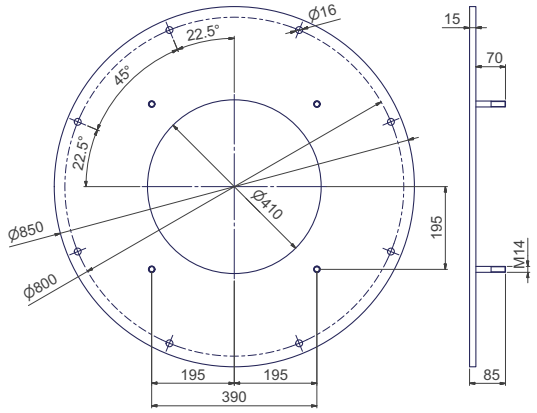


Reccomended burner flange

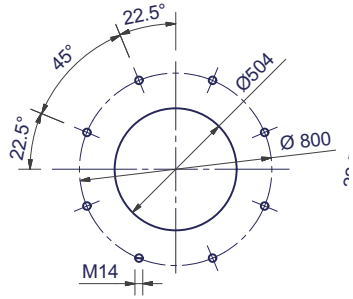
	DN	A	AA	AD	AN	AP	B	BB	C	CC	D	E	F	G	H	J	K	L	M	N	O	P	Q	R	S	U	V	W	Y	Z
KR525	50	1682	144	35	594	100	530	650	1152	598	1585	943	642	454	504	494	540	492	M14	552	390	390	755	150	605	843	216	759	343	270
	65	1682	144	35	612	118	530	650	1152	598	1609	967	642	454	504	494	540	492	M14	552	390	390	633	150	483	843	292	759	343	270
	80	1682	144	35	626	132	530	650	1152	598	1644	1002	642	454	504	494	540	492	M14	552	390	390	685	150	535	875	322	759	343	270
	100	1682	144	35	639	145	530	650	1152	598	1727	1085	642	454	504	494	540	492	M14	552	390	390	792	150	642	942	382	759	343	270

*DN = gas valves size

If necessary, use a counterflange:

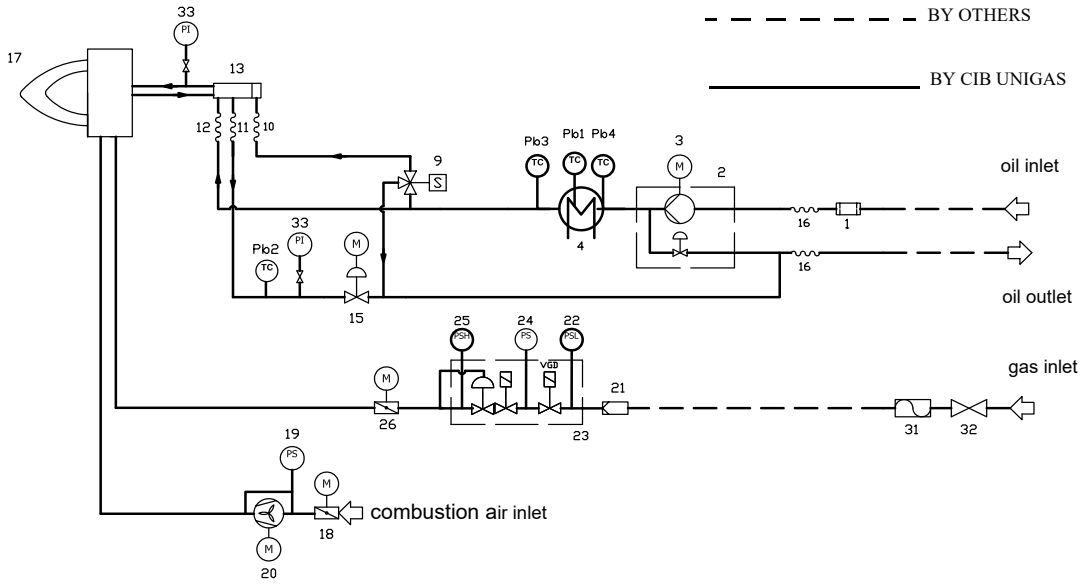


Reccomended counterflange



Boiler recommended drilling template (only for burners with counterflange)

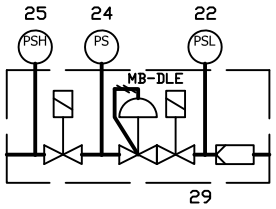
ATTENTION: the counterflange is an optional supplied only on request. A gasket must be placed between the generator and the counterflange



NOTE: The following items are optional: 25, 31, 32, 33

NOTE: The following items are included only on certain types of burner: 10, 11, 12

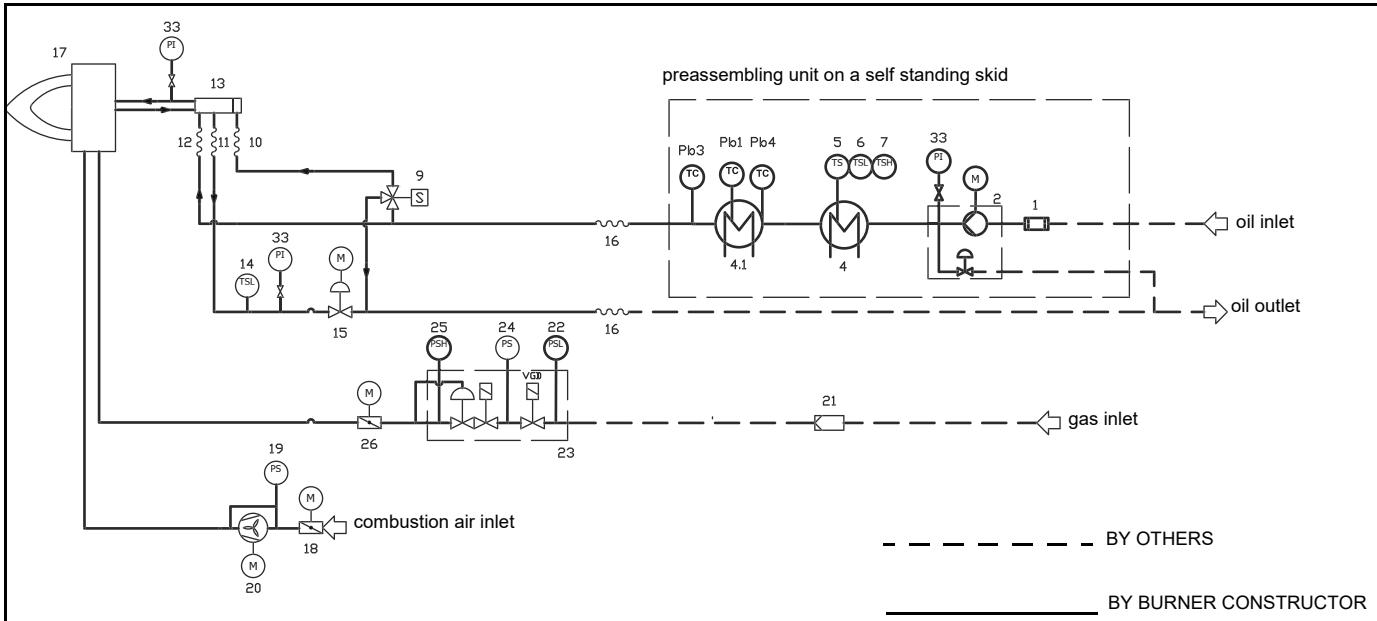
ATTENTION: connect the oil return line to the degassing bottle (standard UNI 9248), as shown in the chapter "Recommendations to design heavy oil feeding plants"



According to the gas train size and the burner type, MB-DLE safety valves are supplied. In this case, the item 21 is integrated in the valves. See the drawing on the left.

	LEGEND 3LMMD22
	OIL TRAIN
1	Filter
2	Pump and pressure governor
3	Electrical motor
33	Pressure gauge with manual valve
4	Electrical preheater tank
Pb4	Temperature probe
Pb1	Temperature probe
Pb3	Temperature probe
9	3-way solenoid valve
10	Flexible hose
11	Flexible hose
12	Flexible hose
Pb2	Temperature probe
13	Oil distributor
15	Pressure governor
16	Flexible hose
17	Burner
	COMBUSTION AIR TRAIN
18	Air damper with actuator
19	Pressure switch - PA
20	Draught fan with electromotor
	MAIN GAS TRAIN
21	Filter
22	Pressure switch - PGMIN
23	Safety valve with built in gas governor (VGD series)
24	Proving system pressure switch - PGCP
25	Pressure switch - PGMAX
26	Butterfly valve
29	Safety valve with built in gas governor & Filter (MB-DLE series)
31	Bellows unit
32	Manual valve

Fig. 4 - 3I2MG23 v0 **Hydraulic diagram**



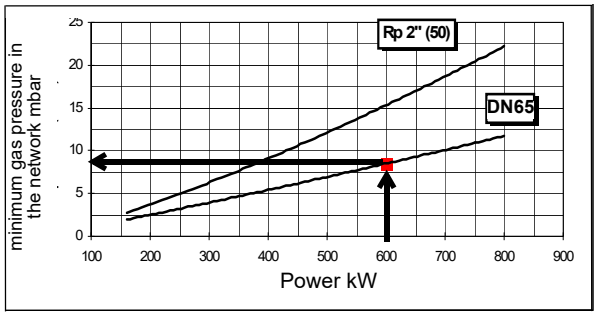
	LEGEND
POS	**OIL TRAIN**
1	Filter
2	Pump and pressure governor
3	Electrical motor
33	Pressure gauge with manual valve
4	Electrical preheater tank
4.1	Electrical preheater tank
5	Thermostat - TR
6	Low thermostat - TCN
7	High thermostat - TRS
Pb4	Temperature probe
Pb1	Temperature probe
Pb3	Temperature probe
9	3-way solenoid valve
10	Flexible hose
11	Flexible hose
12	Flexible hose
13	Oil distributor
14	Low thermostat - TCI
15	Pressure governor
16	Flexible hose
17	Burner
	COMBUSTION AIR TRAIN
18	Air damper with actuator
19	Pressure switch - PA
20	Draught fan with electromotor
	MAIN GAS TRAIN
21	Filter
22	Pressure switch - PGMIN
23	Safety valve with built in gas governor
24	Proving system pressure switch - PGCP
25	Pressure switch - PGMAX
26	Butterfly valve

NOTE: The following items are optional: 25, 33

ATTENTION: connect the oil return line to the degassing bottle (standard UNI 9248), as shown in the chapter "Recommendations to design heavy oil feeding plants"

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.



How to read the burner "Performance curve"

To check if the burner is suitable for the boiler to which it must be installed, 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).

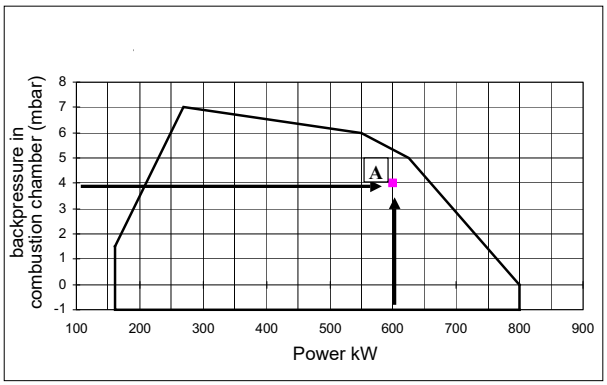
Example:

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.



The values in the diagrams refer to **natural gas** with a calorific value of 8125 kcal/Stm^3 (15°C, 1013 mbar) and a density of 0.714 kg/Stm^3 .

The values in the diagrams refer to **GPL** with a calorific value of 22300 kcal/Stm^3 (15°C, 1013 mbar) and a density of 2.14 kg/Stm^3. When the calorific value and the density change, the pressure values should be adjusted accordingly.

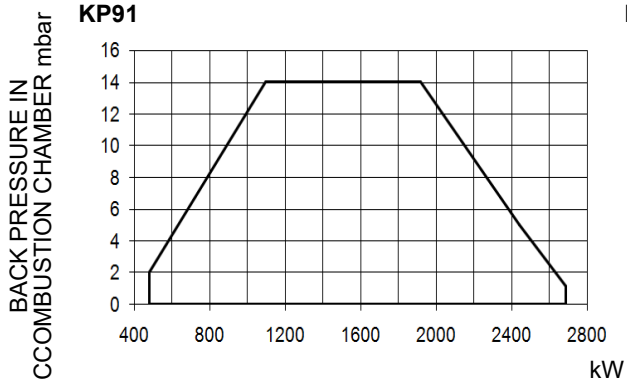
$$\Delta p2 = \Delta p1 \quad * \left(\frac{Q2}{Q1}\right)^2 * \left(\frac{\rho 2}{\rho 1}\right)$$

Where:

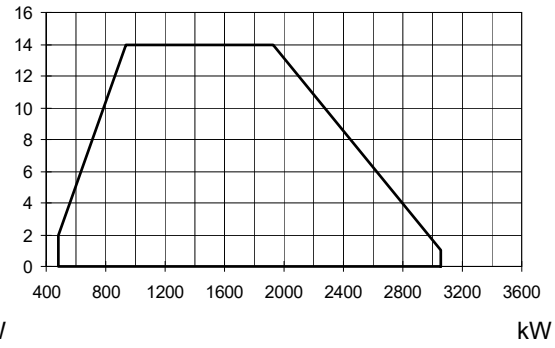
$p1$	Natural gas pressure shown in diagram
$p2$	Real gas pressure
$Q1$	Natural gas flow rate shown in diagram
$Q2$	Real gas flow rate
$\rho 1$	Natural gas density shown in diagram
$\rho 2$	Real gas density

Performance Curves

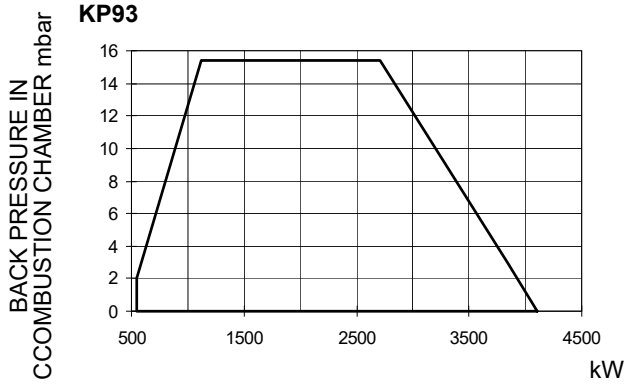
KP91



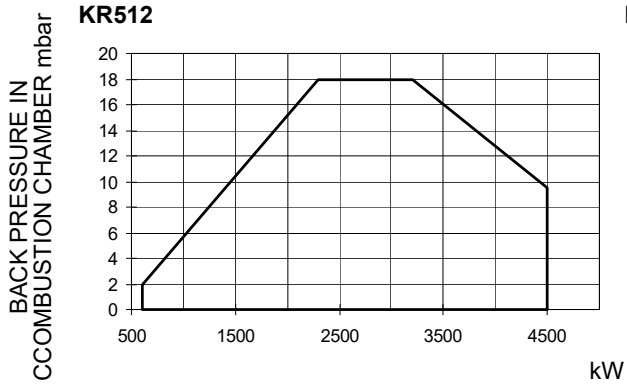
KP92



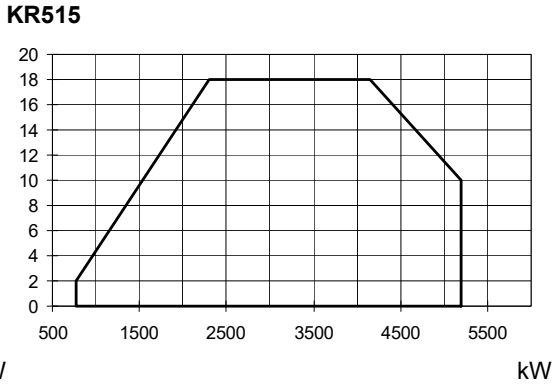
KP93



KR512



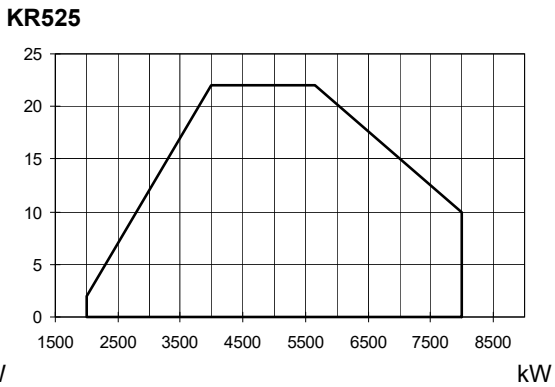
KR515



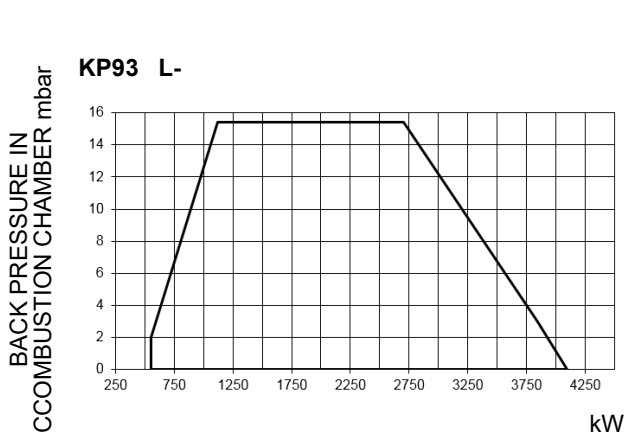
KR520



KR525



KP93 L-



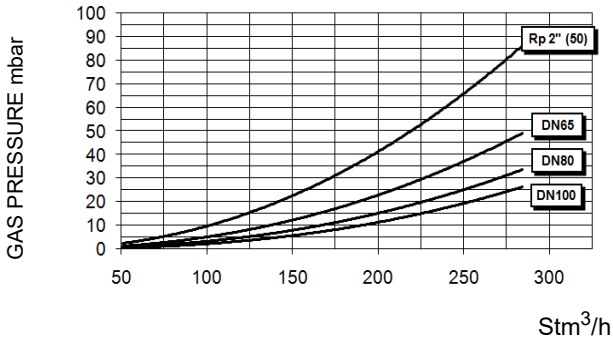
To get the input in kcal/h, multiply value in kW by 860.

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

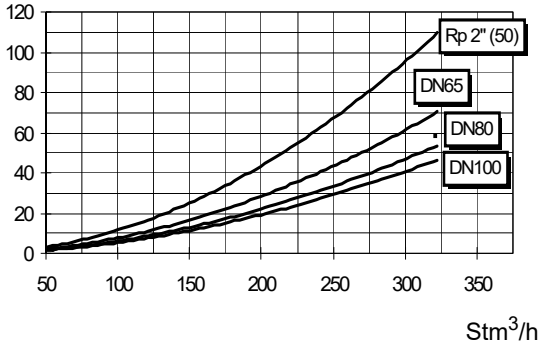
NOTE: The performance curve is a diagram that represents the burner performance in the type approval phase or in the laboratory tests, but does not represent the regulation range of the machine. On this diagram the maximum output point is usually reached by adjsuting the combustion head to its "MAX"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

Pressure in the network - gas rate curves - natural gas

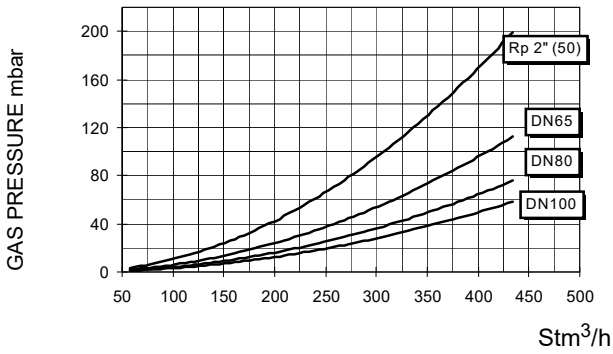
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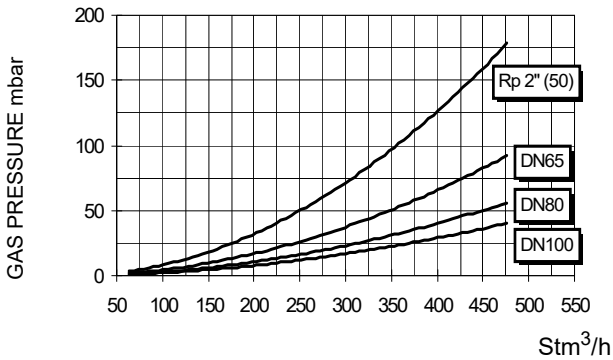
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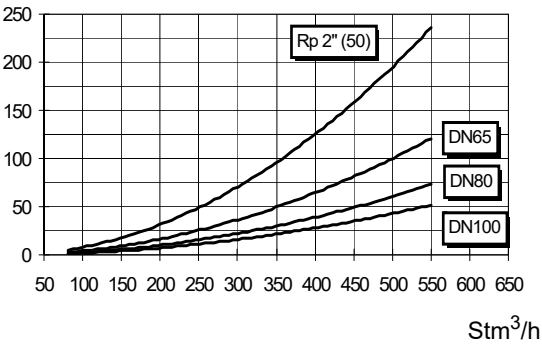
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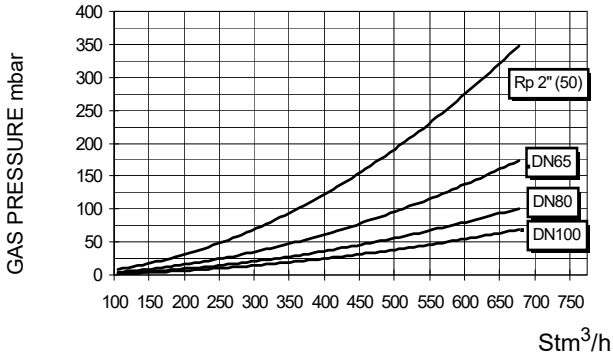
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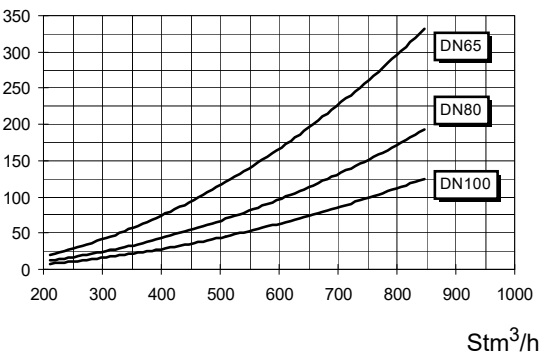
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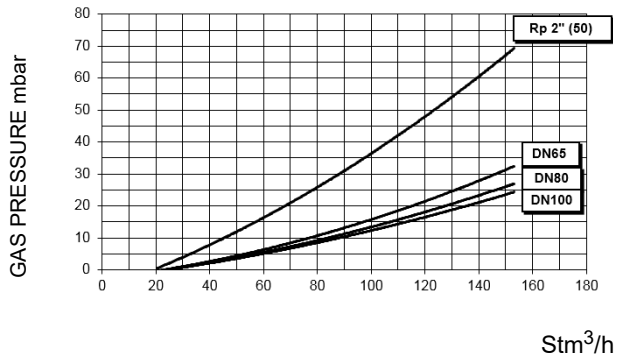
KR520



KR525



KP93 - L-



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

Combustion head gas pressure curves

Combustion head gas pressure depends on gas flow and combustion chamber backpressure. When backpressure is subtracted, it depends only on gas flow, provided combustion is properly adjusted, flue gases residual O2 percentage complies with “Recommended combustion values” table and CO in the standard limits). During this stage, the combustion head, the gas butterfly valve and the actuator are at the maximum opening. Refer to , showing the correct way to measure the gas pressure, considering the values of pressure in combustion chamber, surveyed by means of the pressure gauge or taken from the boiler’s Technical specifications..

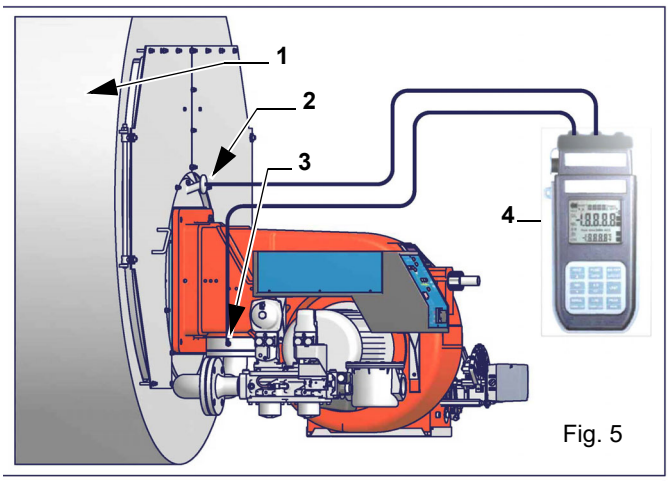


Fig. 5

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

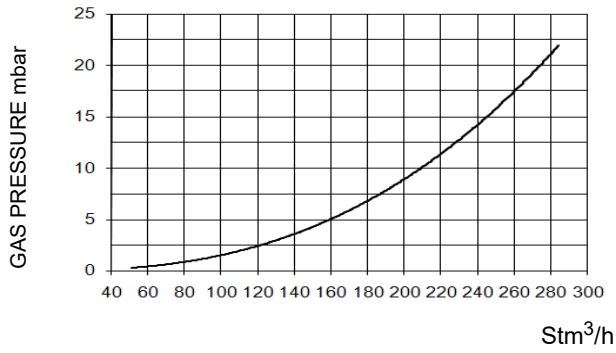
ATTENTION: the burned gas rate must be read at the gas flow meter. when it is not possible, the user can refers to the pressure-rate curves as general information only.

Measuring gas pressure in the combustion head

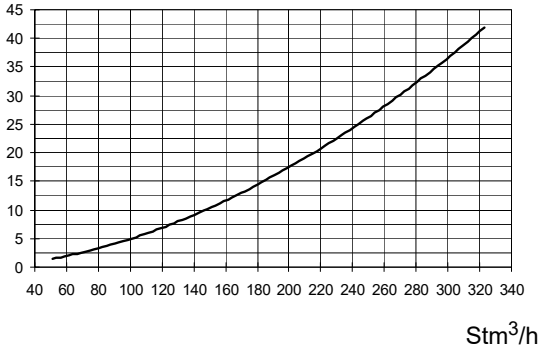
In order to measure the pressure in the combustion head, insert the pressure gauge probes: one into the combustion chamber’s pressure outlet to get the pressure in the combustion chamber and the other one into the butterfly valve’s pressure outlet of the burner. On the basis of the measured differential 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 Stm^3/h (quoted on the x axis) from the pressure measured in the combustion head (quoted on the y axis). The data obtained must be considered when adjusting the gas flow rate.

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

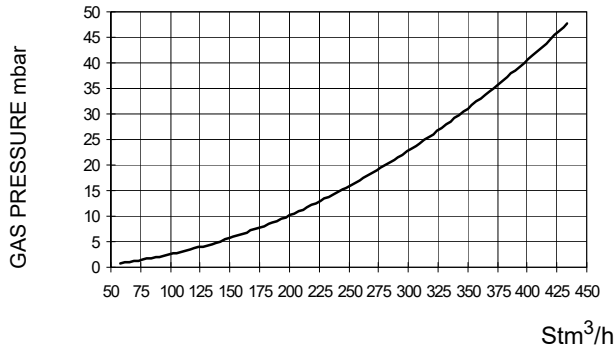
KP91



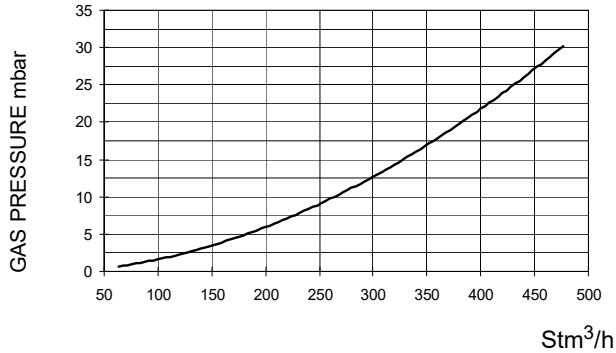
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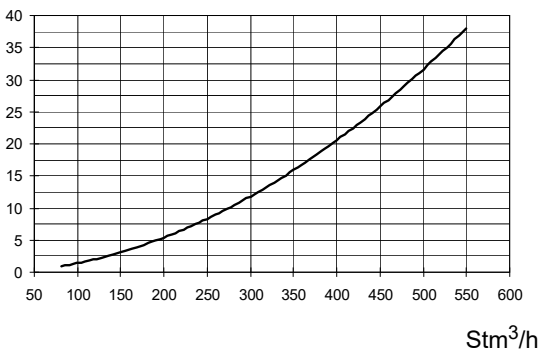
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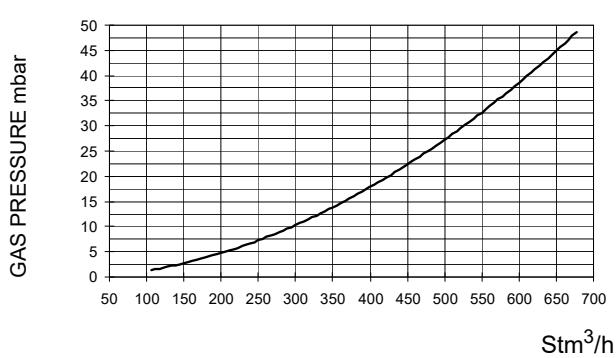
KR512



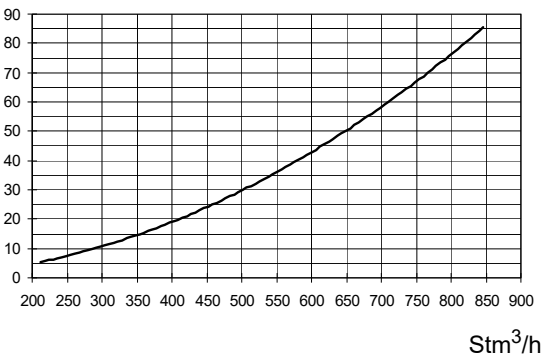
KR515



KR520



KR525



PART II: INSTALLATION

MOUNTING AND CONNECTING THE BURNER

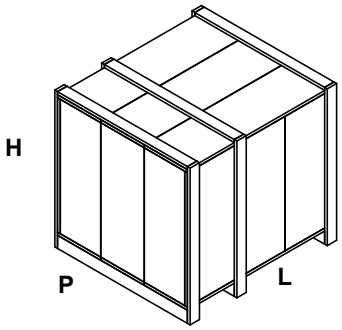
Transport and storage

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

The burners are despatched wooden cages whose dimensions:
KP91-KP92-KP93: 1730mmx 1280mm x 1020mm (L x P x H)
KP512-KP515-KP520-KP525: 1730mm x 1430mm x 1130mm (L x P x H)



Packing cases of this kind are affected by humidity and are not suitable for stacking. The following are placed in each packing case:

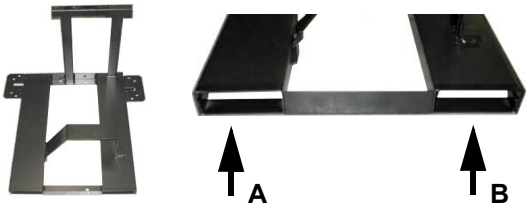
- burner with gas train detached;
- gasket to be inserted between the burner and the boiler;
- envelope containing this manual

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

Handling the burner

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

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



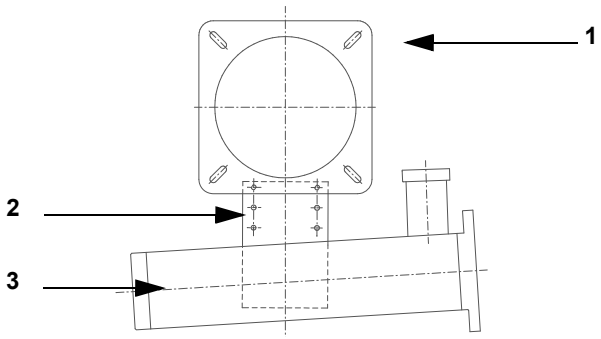
Set the upper side of the burner flange in a horizontal position, in order to obtain the correct inclination of the pre-heating tank

Key

1 Burner flange (upper side indicated)

2 Bracket

3 Pre-heating tank on the burner



Fitting the burner to the boiler

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

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

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

3 place the 4 stud bolts (5) on boiler’s door, according to the burner drilling template described on paragraph “Overall dimensions”;

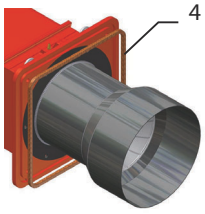
4 fasten the 4 stud bolts;

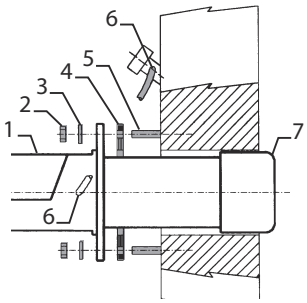
5 place the gasket on the burner flange;

6 install the burner into the boiler;

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

8 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).





Keys

1 Burner

2 Fixing nut

3 Washer

4 Sealing gasket

5 Stud bolt

7 Blast tube

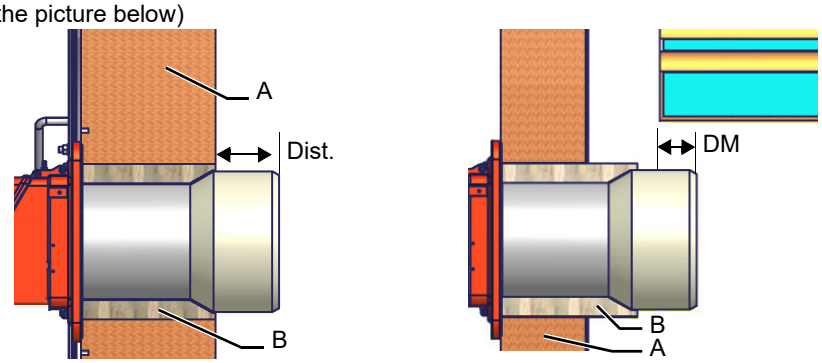
Matching the burner to the boiler

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 follow the instructions of the boiler manufacturer. In absence of these consider the following:

- Cast-iron boilers, three pass flue boilers (with the first pass in the rear part): the blast tube must protrude no more than **Dist** = 100 mm into the combustion chamber. (please see the picture below)
- Pressurised boilers with flame reversal: in this case the blast tube must penetrate **Dm** 50 ÷ 100 mm into combustion chamber in respect to the tube bundle plate.(please see the picture below)

A: ceramic fibre
B: refractory wall

Dist. = 100 mm
DM = 50 ÷ 100 mm



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

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 or to design a blast tube tha suites the utilisation (please, contact the manifacturer).

GAS TRAIN CONNECTIONS

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.

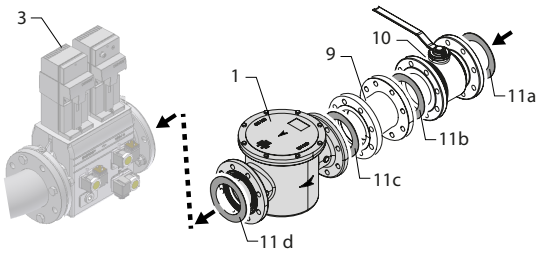
CAUTION: The direction of gas flow must follow the arrow on the body of the components mounted on the gas ramp (valves, filters, gaskets...).

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

Following the "Hydraulic Schematics" section, the figure shows the components fitted by the installer.

Keys

1 Gas filter
3 Gas valves group
9 Bellows unit
10 Manual valve
11 Gasket(a, b, c, d)

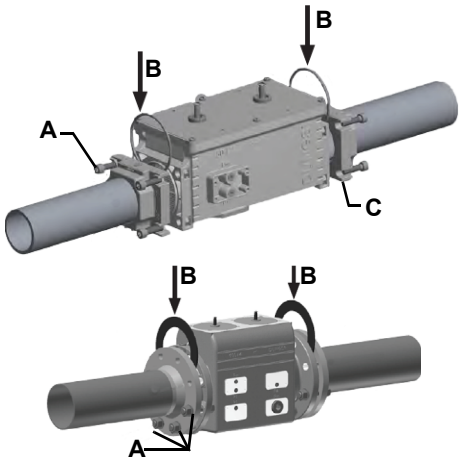


Procedure to install the double gas valve unit: **two (2) gas flanges are required; they may be threaded or flanged depending on size**

- **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**

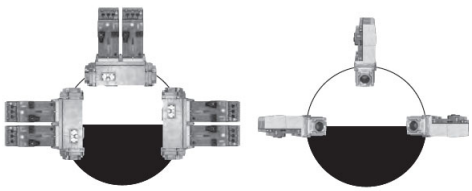
In all cases:

- ensure that the gaskets are correctly positioned between the flanges;
- fasten all the components with screws, according to the following diagrams:
- make sure bolts on the flanges are properly tightened
- check that the connections of all components are leak .



CAUTION: Use seals suitable for the gas used.

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



Gas Filter (if provided)

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

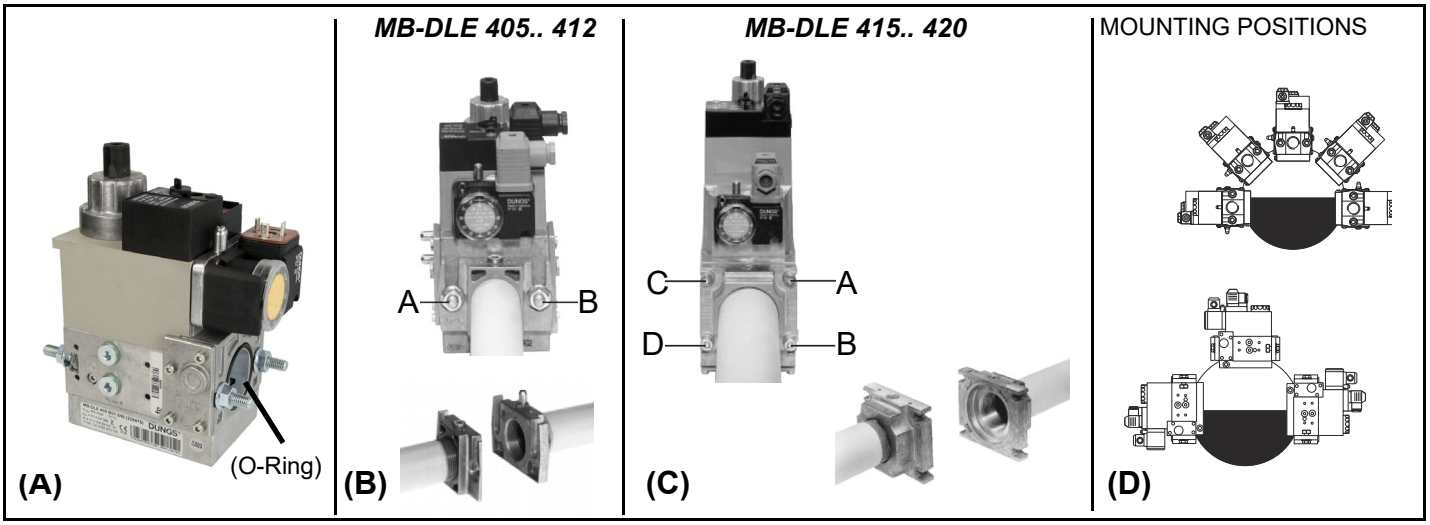
ATTENTION: it is reccomended to install the filter with gas flow parallel to the floor in order to prevent dust fall on the safety valve during maintenance operation.

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

MultiBloc MB-DLE - *Assembling the gas train*

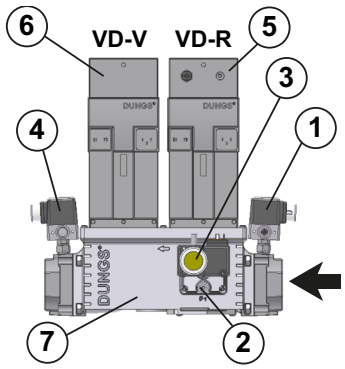
Mounting

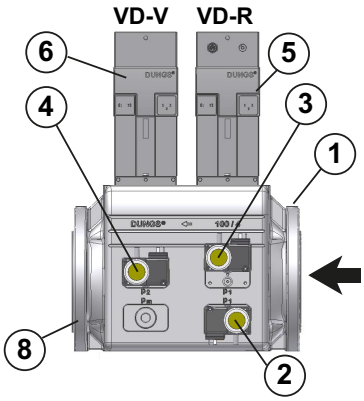
1 Mount flange onto tube lines: use appropriate sealing agent
2 Insert MB-DLE: note position of O rings
3 Remove MultiBloc between the threaded flanges
4 After installation, perform leakage and functional test
5 Disassembly in reverse order



DUNGS MBE

Components and position of pressure switches

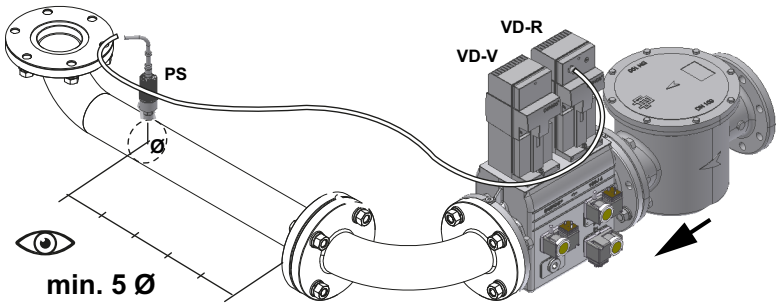


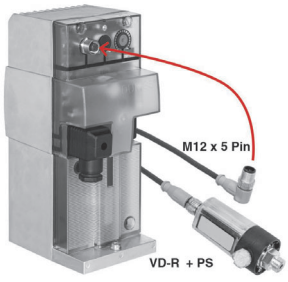


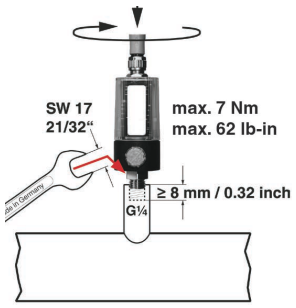
1 PGMIN minimum gas pressure switch
2 PGMIN minimum gas pressure switch (alternative to 1)
3 PGCP leakage control gas pressure switch
4 PGMAX maximum gas pressure switch
5 Actuator with integrated pressure stabiliser
6 On-Off actuator
7 Valve body (Threaded)
8 Valve body (Flange)

On equipment versions Facile VD-R must be installed upstream valve

PS pressure sensor connection to VD-R actuator and gas train

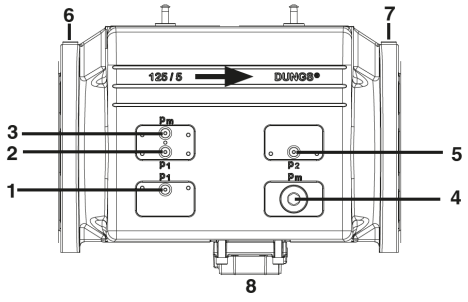


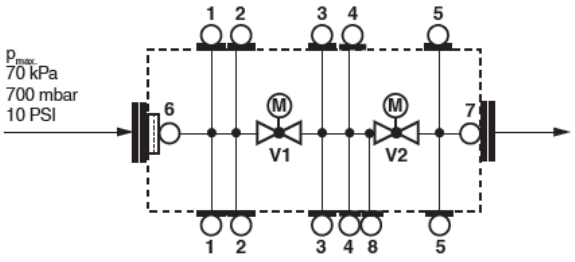




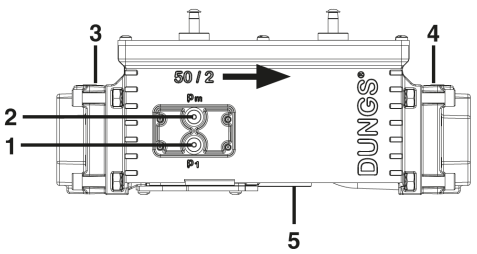
Attention: In the case of the MBE... valve, a pressure limit switch downstream of the safety valve is mandatory.

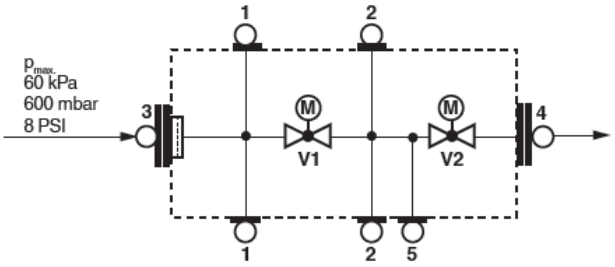
Pressure taps MultiBloc MBE





1, 2, 3, 5 Sealing plug G1/8 ISO 228
4 G3/4 for system accessories
6, 7 Sealing plug G1/4 ISO 228
8 For version VB…L only: connection for vent line
VB-2½L=1¼"NPT
VB-3L=1½"NPT
VB-4L=2"NPT
VB-5L=2"NPT

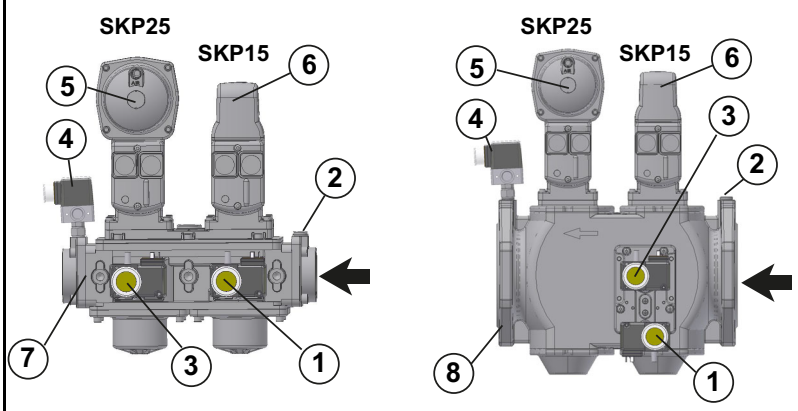




1, 2, 3, 4 Sealing plug G1/8 ISO 228
5 Locking screw
For version VB-2L only: connection for vent line **NPT 1**

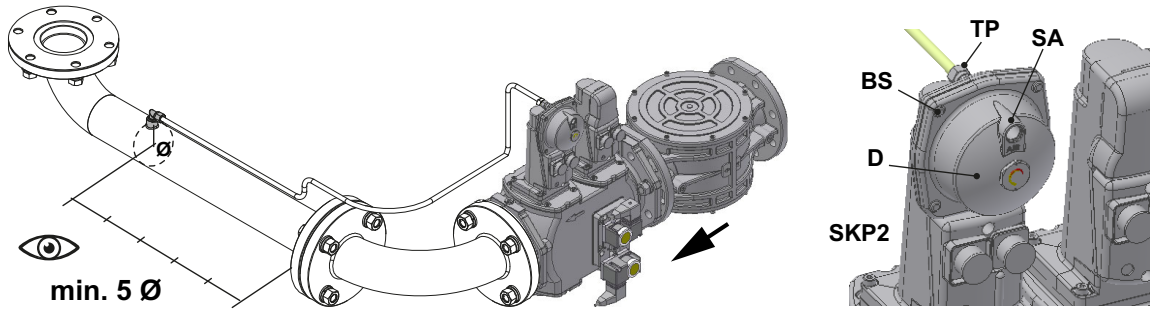
Siemens VGD20.. e VGD40..

Components and position of pressure switches



1 PGMIN minimum gas pressure switch
2 PGMIN minimum gas pressure switch (alternative to 1)
3 PGCP leakage control gas pressure switch
4 PGMAX maximum gas pressure switch
5 Actuator with integrated pressure stabiliser
6 On-Off actuator
7 Valve body (Threaded)
8 Valve body (Flange)

Connection of actuator SKP2... to gas train



Siemens SKP2.. (pressure governor)

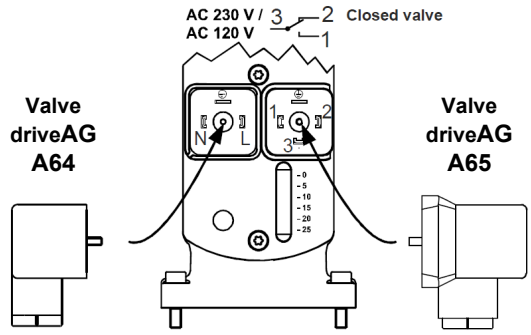
- Connect the reference gas pipe (**TP** in figure; 8mm-external size pipe supplied loose), to the gas pressure nipples placed on the gas pipe, downstream the gas valves: gas pressure must be measured at a distance that must be at least 5 times the pipe size.
- Leave the blowhole free (**SA** in figure). Should the spring fitted not permit satisfactory regulation, ask one of our service centres for a suitable replacement.

- D: pressure adjustment spring seat

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

version with SKP2 (built-in pressure stabilizer)Siemens VGD../VRD.. SKPx5 (Auxiliary-optional micro switch)Gas valve

If the auxiliary microswitch (POC) is required, a dedicated actuator, different from the one usually supplied, must be ordered. The connection is shown in the figure.

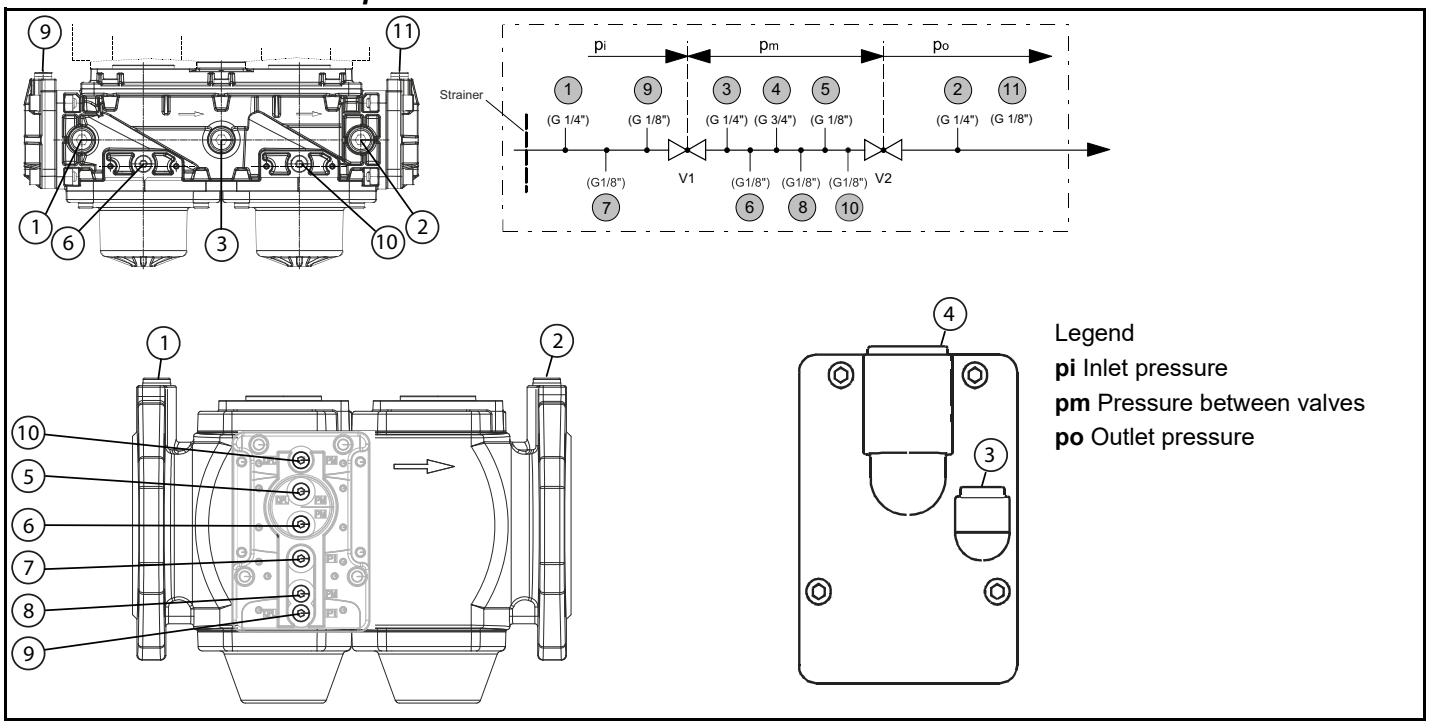


AGA64 - Valve drivePlug connection ON-OFF
AGA65 - End of strokePlug connection POC

End of stroke (POC)

The connection plug of the POC is different from that of the ON-OFF drive

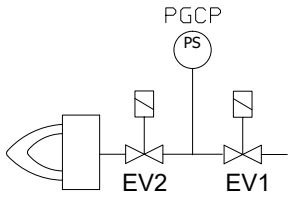
Siemens VGD *Pressure taps*

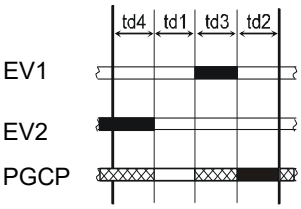


Integrated proving system (burners equipped with LME7x, LMV, LDU)

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.

OIL TRAIN CONNECTIONS

About the use of fuel pumps

- Do not use fuel with additives to avoid the possible formation over time of compounds which may deposit between the gear teeth, thus obstructing them.
- After filling the tank, wait before starting the burner. This will give any suspended impurities time to deposit on the bottom of the tank, thus avoiding the possibility that they might be sucked into the pump.
- On initial commissioning a "dry" operation is foreseen for a considerable length of time (for example, when there is a long suction line to bleed). To avoid damages inject some lubrication oil into the vacuum inlet.
- Care must be taken when installing the pump not to force the pump shaft along its axis or laterally to avoid excessive wear on the joint, noise and overloading the gears.
- Pipes should not contain air pockets. Rapid attachment joint should therefore be avoided and threaded or mechanical seal junctions preferred. Junction threads, elbow joints and couplings should be sealed with removable sg component. The number of junctions should be kept to a minimum as they are a possible source of leakage.
- Do not use PTFE tape on the suction and return line pipes to avoid the possibility that particles enter circulation. These could deposit on the pump filter or the nozzle, reducing efficiency. Always use O-Rings or mechanical seal (copper or aluminium gaskets) junctions if possible.
- An external filter should always be installed in the suction line upstream the fuel unit.

***ATTENTION**: before the burner first start, it is mandatory to fill the adduction pipes with diesel fuel and bleed out residual air bubbles. Prior to switching on the burner, check direction of rotation of the pump motor by briefly pressing the starter switch; ensure there are no anomalous sounds during equipment operation, and only then turn on the burner. Neglect to comply with this requirement will invalidate the burner warranty.*

Depending on the installed pump, it is possible to design the plant for single or double pipe feeding line

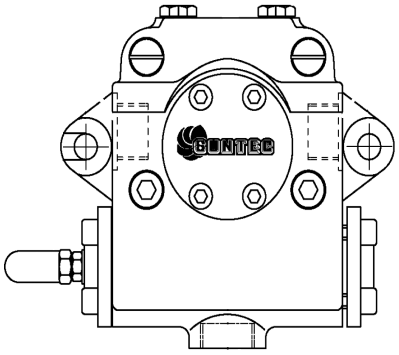
Single-pipe system: a single pipe drives the oil from the tank to the pump's inlet. Then, from the pump, the pressurised oil is driven to the nozzle: a part comes out from the nozzle while the othe part goes back to the pump. In this system, the by-pass plug, if provided, must be removed and the optional return port, on the pump's body, must be sealed by steel plug and washer.

Double-pipe system: as for the single pipe system, a pipe that connects the tank to the pump's inlet is used besides another pipe that connects the pump's return port to the tank, as well. The excess of oil goes back to the tank: this installation can be considered self-bleeding. If provided, the inside by-pass plug must be installed to avoid air and fuel passing through the pump.

Burners come out from the factory provided for double-pipe systems. They can be suited for single-pipe system (recommended in the case of gravity feed) as decribed before.To change from a 1-pipe system to a 2-pipe-system, insert the by-pass plug **G** (as for ccw-rotation- referring to the pump shaft).

Caution: Changing the direction of rotation, all connections on top and side are reversed.**HP UHE series pumps**: a kit (Art.-Nr.: 0841211) is required for the transition from 2-pipe to 1-pipe system

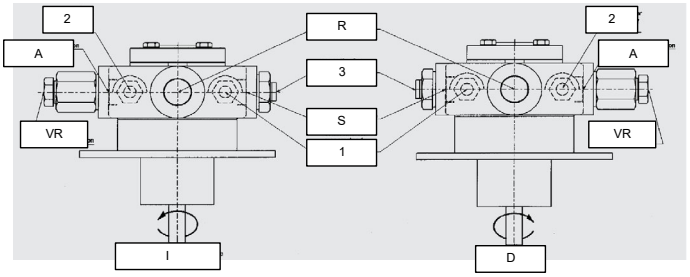
Suntec TA..	
Oil viscosity	3 ÷ 75 cSt
Oil temperature	0 ÷ 150°C
Min. suction pressure	- 0.45 bar to avoid gasing
Max. suction pressure	5 bar
Max. return pressure	5 bar
Rotation speed	3600 rpm max.



1. Inlet G1/2
2. To the nozzle G1/2
3. Return G1/2
4. Pressure gauge port G1/4
5. Vacuum gauge port G1/4
6. Pressure governor

HP-Technick UHE-A..	
Oil viscosity	3 ÷ 75 cSt
Oil temperature	0 ÷ 150°C
Min. suction pressure	- 0.45 bar to avoid gasing
Max. suction pressure	5 bar
Max. return pressure	5 bar
Rotation speed	3600 rpm max.

1. Connection for manometer 1 – delivery (M1) – G1/4
2. Connection for manometer 2 – suction (M2) – G1/4
3. Connection for manometer 3 (M3)
A. Suction connection– G1/2
D. Direct - clockwise
I. Indirect – counter clockwise
R. By-pass connection– G1/2
S. Delivery connection – G1/2
VR. After removal of cover screw: pressure regulation



Connecting the oil flexible hoses to the pump

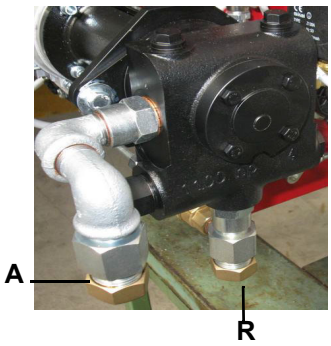
To connect the flexible oil hoses to the pump, proceed as follows, according to the pump provided:

1 remove the closing nuts A and R on the inlet and return connections of the pump;

2 screw the rotating nut of the two flexible hoses on the pump **being careful to avoid exchanging the lines**: see the arrows marked on the pump.

For further information, refer to the technical documentation of the pump.

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Suntec TA	HP Technik UHE-A
	

Diesel filters

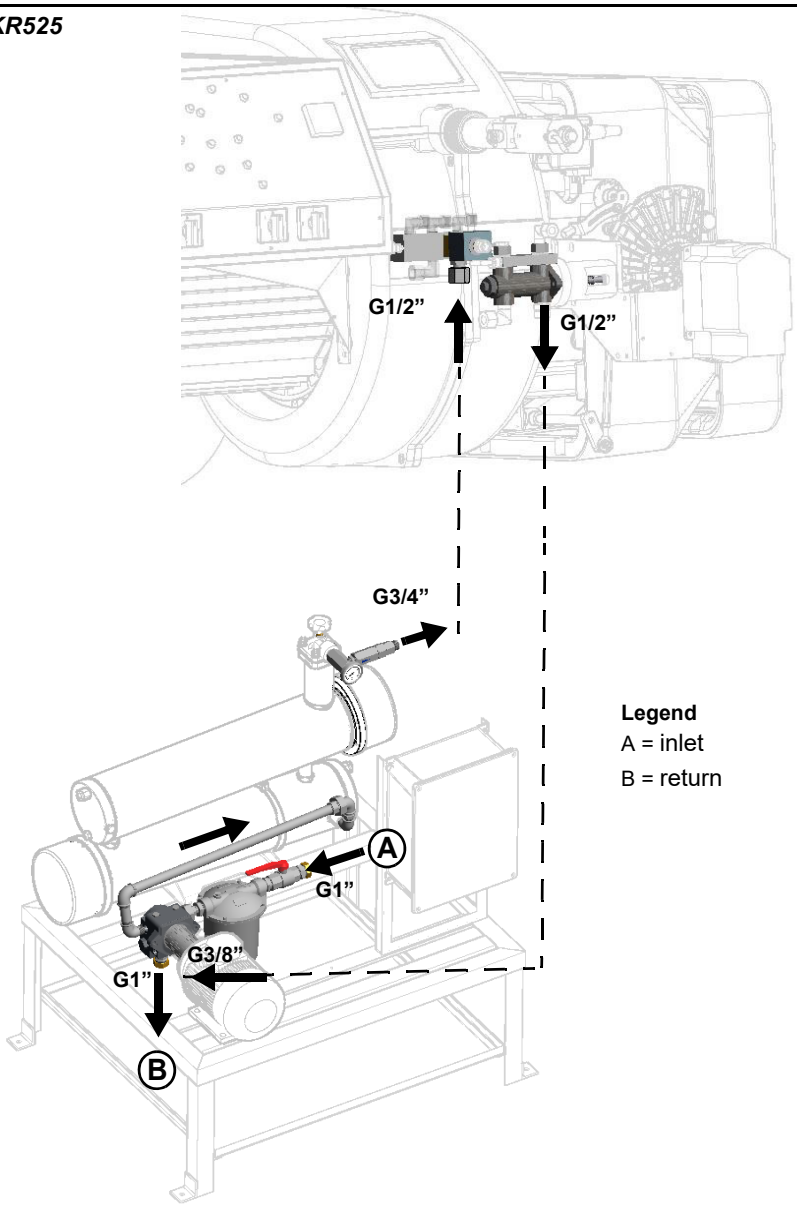


	Item	Note	Connection	Max. operating pressure	Max. operating temperature	Filtering degree	Protec-tion
5	20151PE (*)	-	3/8”	1 bar	-20, 60 °C	100 µ	-
6	20201PL (*)	-	3/8”	1 bar	-20, 60 °C	100 µ	-
7	GA70501	-	1”	4 bar	90 °C	100 µ	IP65

(*) Supplied per pilot diesel fuel if present

Connecting the burner to the oil pumping unit

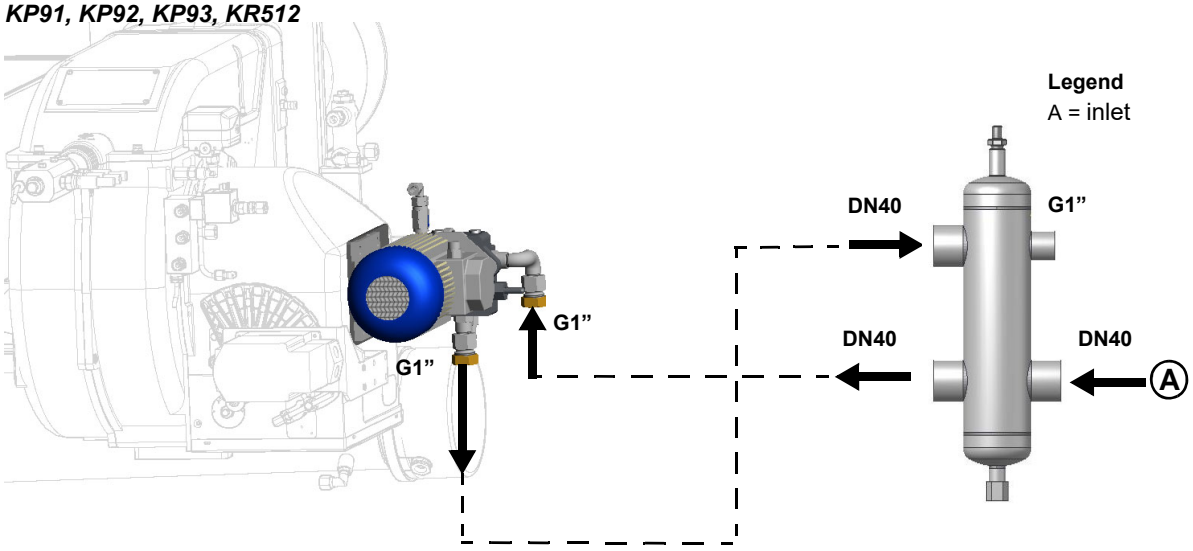
KR515, KR520, KR525



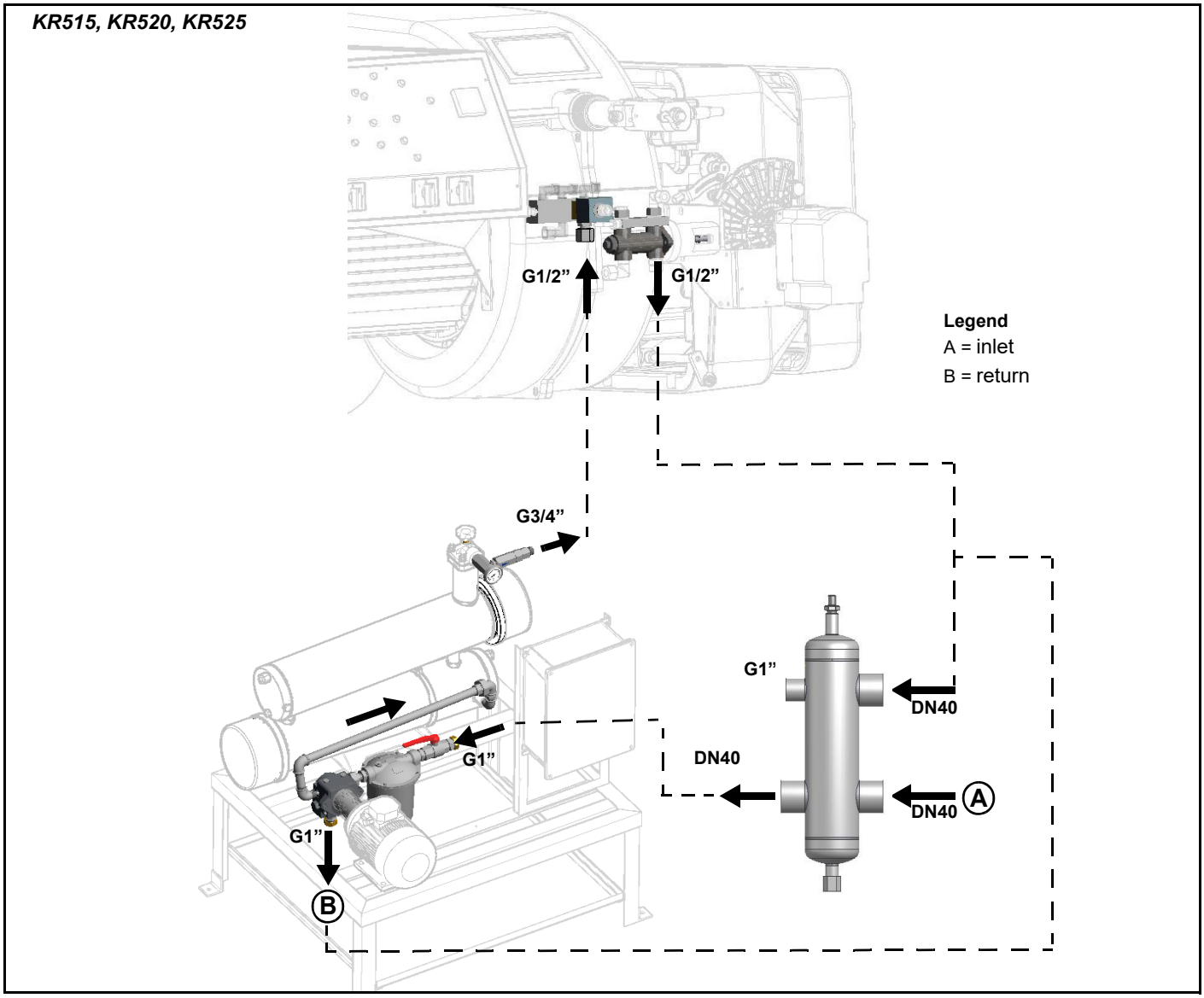
Legend
A = inlet
B = return

PLANT WITH DEGASING BOTTLE

KP91, KP92, KP93, KR512



KR515, KR520, KR525



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.

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

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);
4 refit the panel cover.

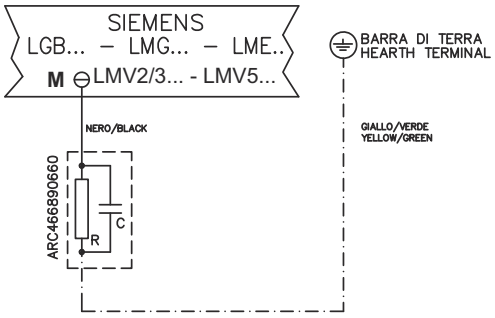
WARNING:It is recommended to install a shunt trip disconnect switch that acts on the preheater unit supply line and avoids the oil overheating / resistance damage in case of a malfunction of the resistance contactor. Inside the electric board a free contact is provided (terminals 507 - 508) for this purpose.

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 avaible on the Siemens CD attached to the burner

Key

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



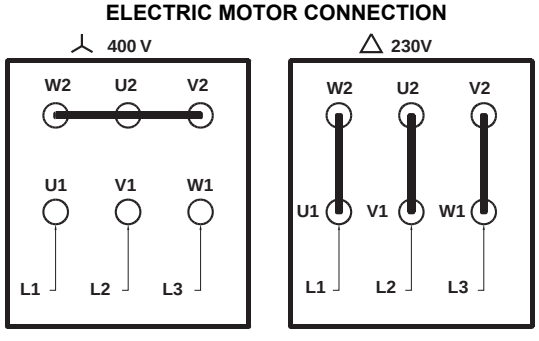
Rotation of electric motor

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 V or 400 V supply, and in the case of three-phase 220 V or 230 V supply it is necessary to modify the electrical connections into the terminal box of the electric motor and replace the overload tripped relay.





Connecting the oil heating resistors

2.4 - 4.5 kW

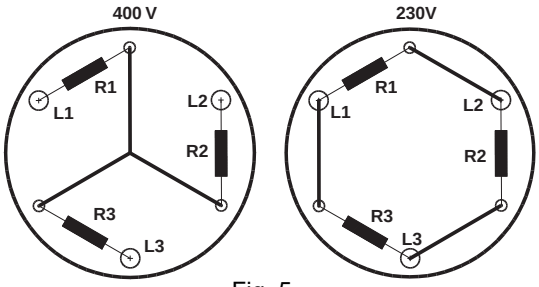


Fig. 5

8 - 12 kW

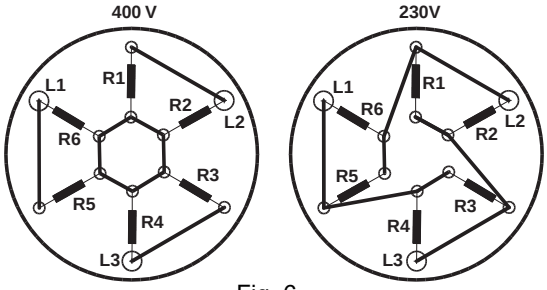


Fig. 6

18 - 24 kW

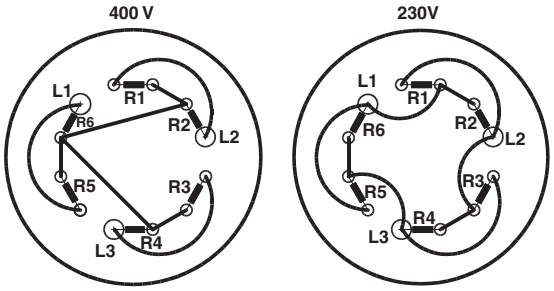


Fig. 7

RECOMMENDATIONS TO DESIGN HEAVY OIL FEEDING PLANTS

This paragraph is intended to give some suggestions to make feeding plants for heavy oil burners. To get a regular burner operation, it is very important to design the supplying system properly. Here some suggestions will be mentioned to give a brief description.

The term “heavy oil” is generic and summarises several chemical-physical properties, above all viscosity. The excessive viscosity makes the oil impossible to be pumped, so it must be heated to let it flow in the pipeline; because of the low-boiling hydrocarbons and dissolved gases, the oil must be also pressurised. The pressurisation is also necessary to feed the burner pump avoiding its cavitation because of the high suction at the inlet. The supplying system scope is to pump and heat oil.

The oil viscosity is referred in various unit measures; the most common are: °E, cSt, Saybolt and Redwood scales. Table 3 shows the-various unit convertions (e.g.: 132 cSt viscosity corresponds to 17.5°E viscosity). The diagram in Fig. 8 shows how the heavy oil viscosity changes according to its temperature.

Example: an oil with 22°E viscosity at 50°C once heated to 100°C gets a 3 °E viscosity.As far as the pumping capability, it depends on the type of the pump that pushes the oil even if on diagram in Fig. 8 a generic limit is quoted at about 100 °E, so it is recommended to refer to the specifications of the pump provided. Usually the oil minimum temperature at the oil pump inlet increases as viscosity does, in order to make the oil easy to pump. Referring to the diagram on Fig. 9, it is possible to realise that to pump an oil with 50°E viscosity at 50°C, it must be heated at about 80°C.

Pipe heating system

Pipe heating system must be provided, that is a system to heat pipes and plant components to mantain the viscosity in the pumping limits. Higher the oil viscosity and lower the ambient temperature, more necessary the pipe heating system.

Inlet minimum pressure of the pump (both for supplying system and burner)

A very low pressure leads to cavitation (signalled by its peculiar noise): the pump manifacturer declares the minimum value. Therefore, check the pump technical sheets. By increasing the oil temperature, also the minimum inlet pressure at the pump must increase, to avoid the gassification of the oil low-boiling products and the cavitation. The cavitation compromises the burner operation, it causes the pump to break too. The diagram on Fig. 10 roughly shows the inlet pump pressure according to the oil temperature.

Pump operating maximum pressure (both for the supplying system and burner)

Remember that pumps and all the system components through which the oil circulates, feature an upper limit. Always read the technical documentation for each component. Schemes on Fig. 5 and Fig. 13 are taken from UNI 9248 "liquid fuel feeding lines from tank to burner" standard and show how a feeding line should be designed. For other countries, see related laws in force. The pipe dimensioning, the execution and the winding dimensioning and other construcitve details must be provided by the installer.

Adjusting the supplying oil ring

According to the heavy oil viscosity used, in the table below indicative temperature and pressure values to be set are shown.

Note: the temperature and pressure range allowed by the supplying ring components must be checked in the specifications table of the components themselves.

HEAVY OIL VISCOSITY AT 50 °C		PIPELINE PRESSURE	PIPELINE TEMPERATURE
cSt (°E)		bar	°C
	< 50 (7)	1- 2	20
> 50 (7)	< 110 (15)	1- 2	50
> 110 (15)	< 400 (50)	1- 2	65

Tab. 1

Viscosity units conversion table

Cinematics viscosity Centistokes (cSt)	Engler Degrees (°E)	Saybolt Seconds Universal (SSU)	Saybolt Seconds Furol (SSF)	Redwood Seconds no.1 (Standard)	Redwood Seconds no..2 (Admiralty)
1	1	31	--	29	--
2.56	1.16	35	--	32.1	--
4.3	1.31	40	--	36.2	5.1
7.4	1.58	50	--	44.3	5.83
10.3	1.88	60	--	52.3	6.77
13.1	2.17	70	12.95	60.9	7.6
15.7	2.45	80	13.7	69.2	8.44
18.2	2.73	90	14.44	77.6	9.3
20.6	3.02	100	15.24	85.6	10.12
32.1	4.48	150	19.3	128	14.48
43.2	5.92	200	23.5	170	18.9
54	7.35	250	28	212	23.45
65	8.79	300	32.5	254	28
87.6	11.7	400	41.9	338	37.1
110	14.6	500	51.6	423	46.2
132	17.5	600	61.4	508	55.4
154	20.45	700	71.1	592	64.6
176	23.35	800	81	677	73.8
198	26.3	900	91	762	83
220	29.2	1000	100.7	896	92.1
330	43.8	1500	150	1270	138.2
440	58.4	2000	200	1690	184.2
550	73	2500	250	2120	230
660	87.6	3000	300	2540	276
880	117	4000	400	3380	368
1100	146	5000	500	4230	461
1320	175	6000	600	5080	553
1540	204.5	7000	700	5920	645
1760	233.5	8000	800	6770	737
1980	263	9000	900	7620	829
2200	292	10000	1000	8460	921
3300	438	15000	1500	13700	--
4400	584	20000	2000	18400	--

Tab. 2

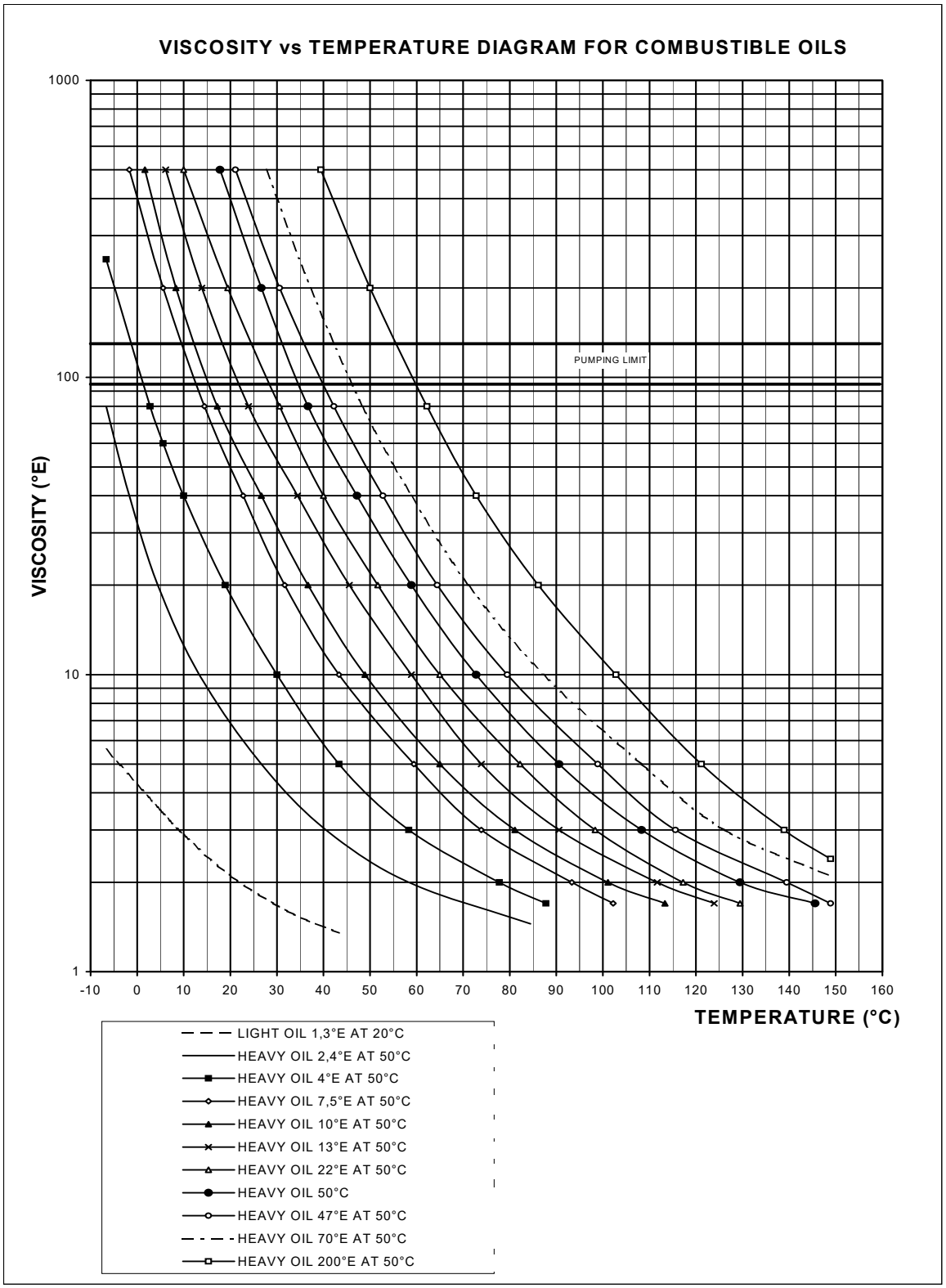

VISCOSITY vs TEMPERATURE DIAGRAM FOR COMBUSTIBLE OILS
VISCOSITY (°E)
1000
100
10
1
PUMPING LIMIT
-10
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
TEMPERATURE (°C)
LIGHT OIL 1,3°E AT 20°C
HEAVY OIL 2,4°E AT 50°C
HEAVY OIL 4°E AT 50°C
HEAVY OIL 7,5°E AT 50°C
HEAVY OIL 10°E AT 50°C
HEAVY OIL 13°E AT 50°C
HEAVY OIL 22°E AT 50°C
HEAVY OIL 50°C
HEAVY OIL 47°E AT 50°C
HEAVY OIL 70°E AT 50°C
HEAVY OIL 200°E AT 50°C

Fig. 8

Indicative diagram showing the oil temperature at burner pump inlet vs. oil viscosity

Example: if the oil has a 50°E @ 50°C viscosity, the oil temperature at the pump inlet should be 80°C (see diagram).

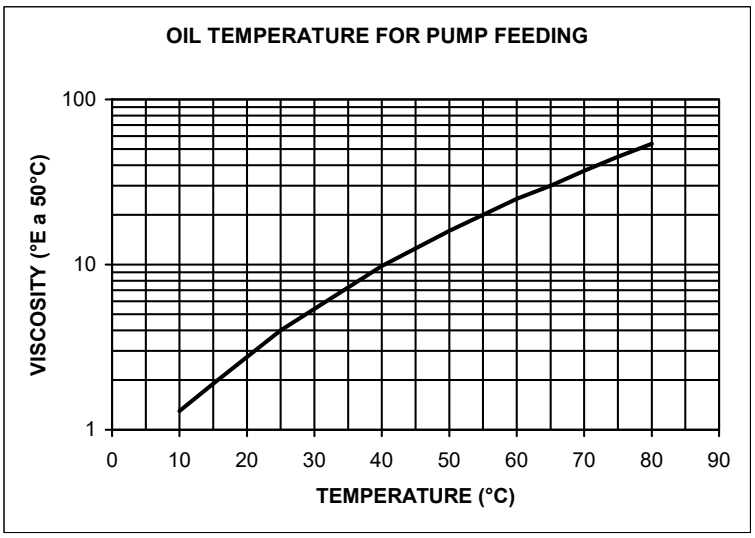


Fig. 9

Indicative diagram showing the oil pressure according to its temperature

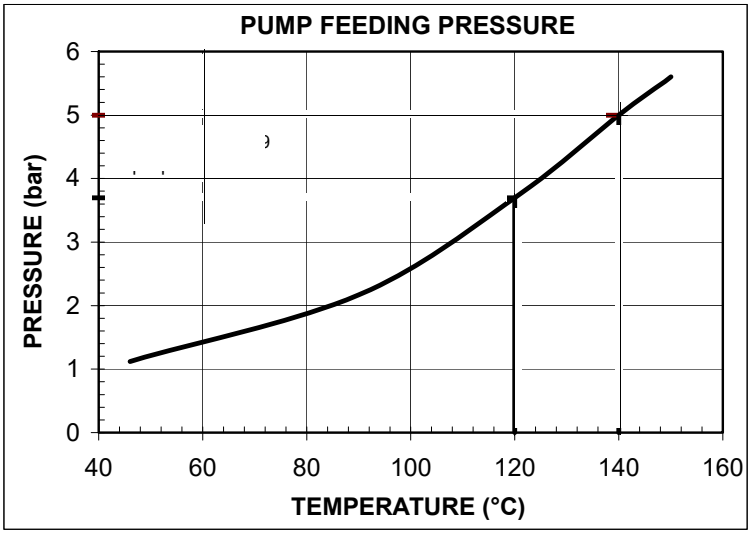


Fig. 10

Indicative diagram showing the oil atomising temperature according to its viscosity

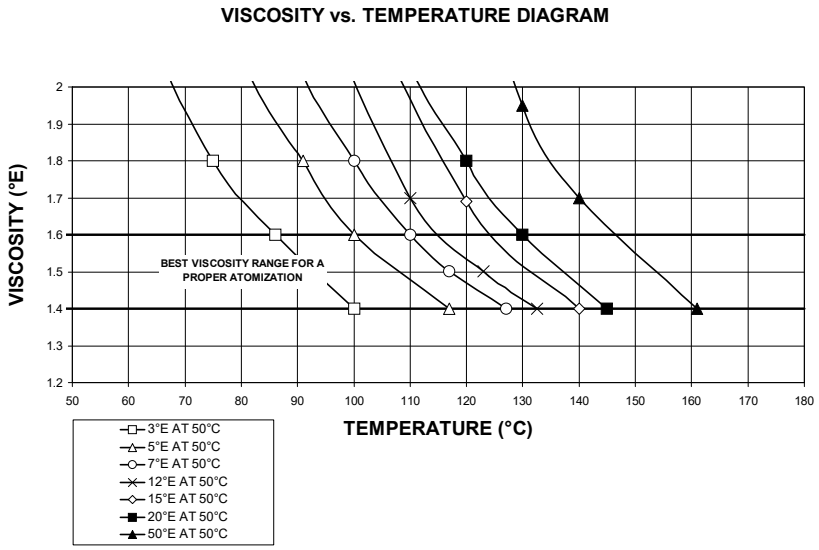
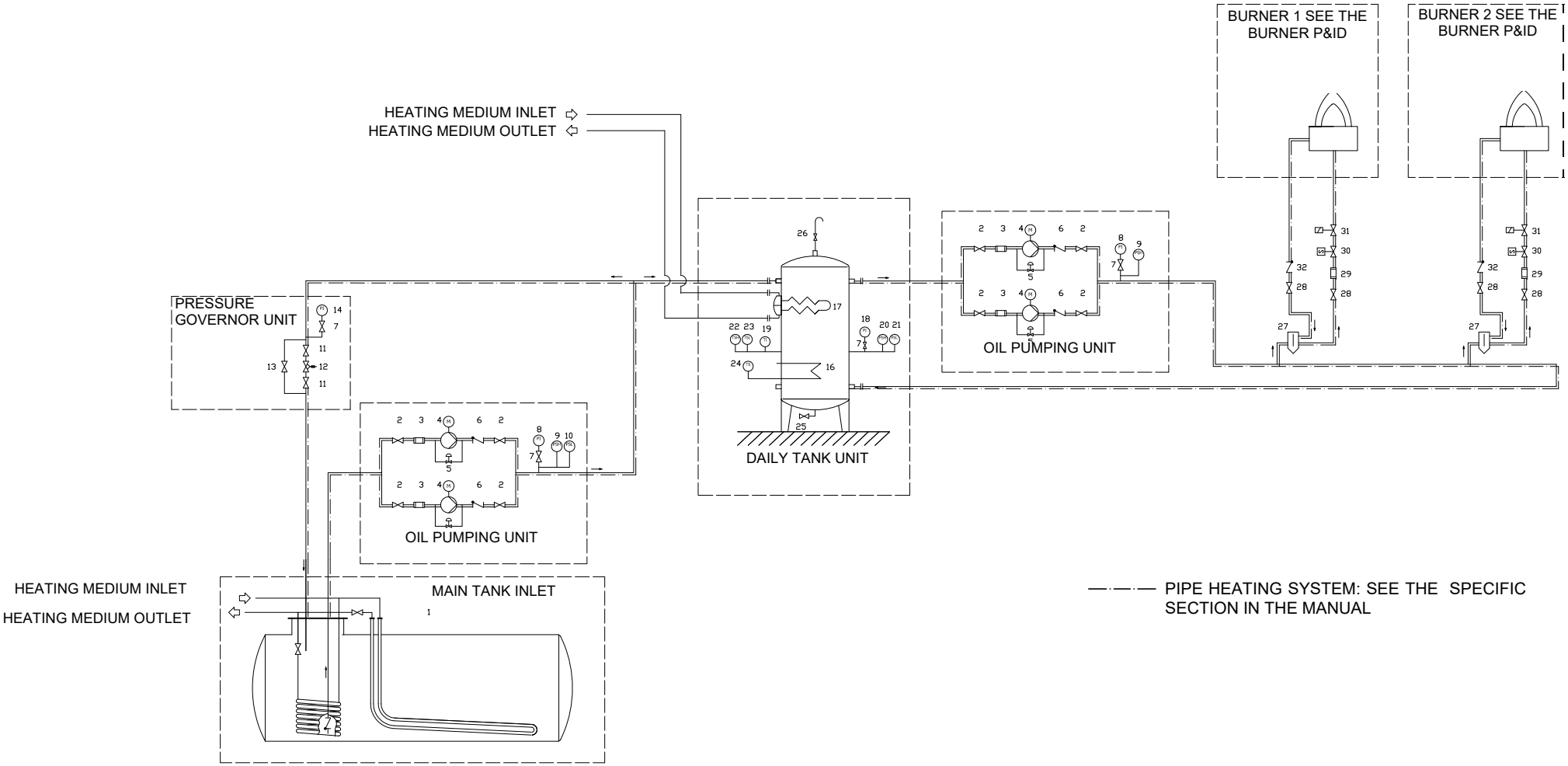


Fig. 11

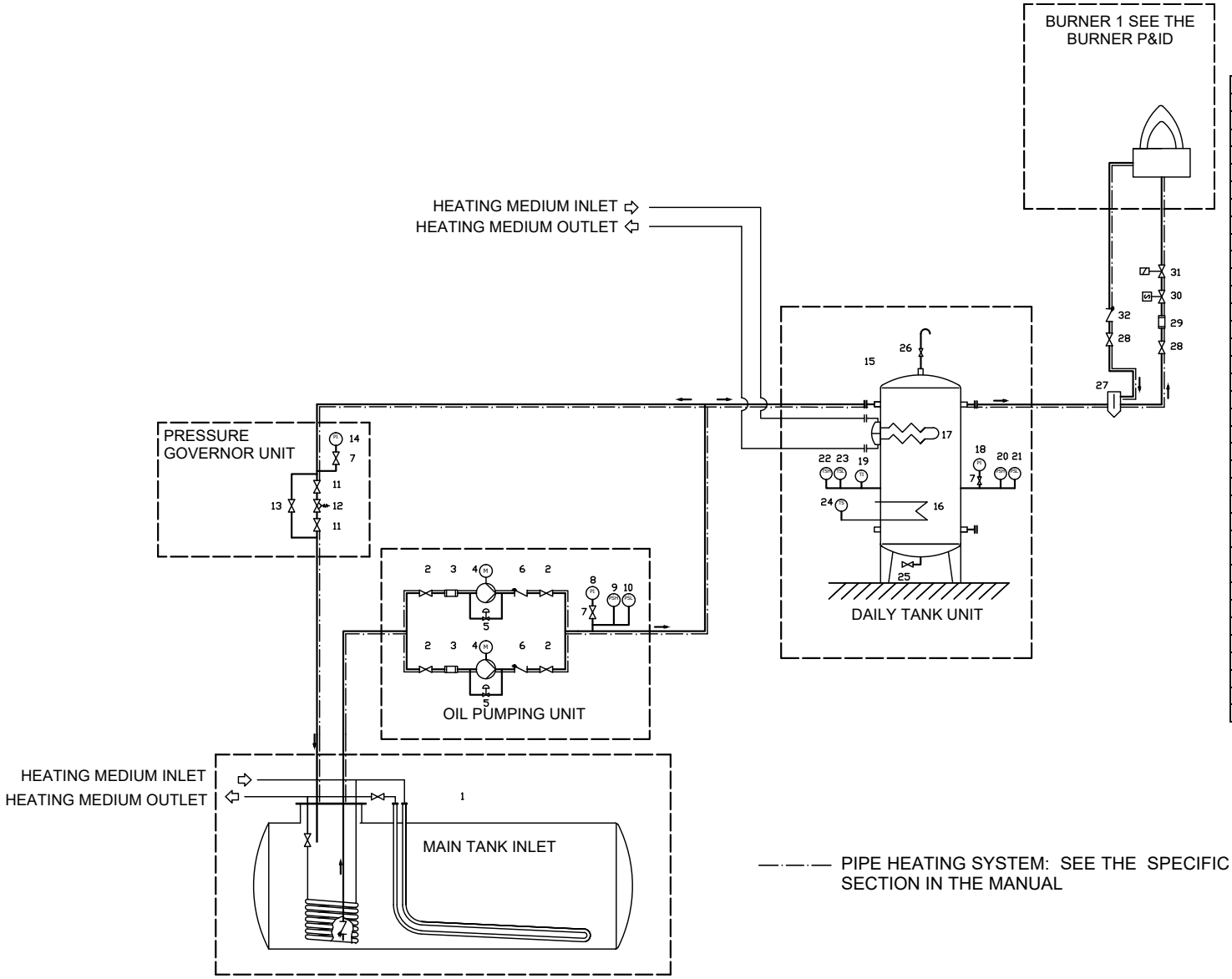
Example: if the oil has a 50°E @ 50°C viscosity, the oil atomising temperature should be between 145°C and 160°C (see diagram).

Fig. 12 3ID00014 v2 **Hydraulic diagram - Two or more burners configuration**



	OIL TRAIN		**PRESSURE GOVERNOR UNIT**				
1	Main tank	11	Manual valve	21	Low pressure switch	31	Safety valve
	OIL PUMPING UNIT	12	Pressure governor	22	Thermostat (high)	32	One-way valve
2	Manual valve	13	Needle valve	23	Thermostat (low)		
3	Filter	14	Pressure gauge	24	Thermostat		
4	Pump coupled to electrical motor		**DAILY TANK**	25	Manual valve		
5	Safety valve	15	Daily tank	26	Manual valve		
6	One-way valve	16	Electrical resistor		**TO THE BURNER**		
7	Manual valve	17	Heating device	27	Degassing bottle		
8	Pressure gauge	18	Pressure gauge	28	Manual valve		
9	Maximum pressure switch	19	Thermometer	29	Filter (supplied loose with the burner)		
10	Minimum pressure switch	20	High pressure switch	30	Solenoide valve		

Fig. 13 - 3ID0023 v2 - **Hydraulic diagram - Single burner configuration**



	OIL TRAIN
1	Main tank
	OIL PUMPING UNIT
2	Manual valve
3	Filter
4	Pump coupled to electrical motor
5	Safety valve
6	One-way valve
7	Manual valve
8	Pressure gauge
9	Maximum pressure switch
10	Minimum pressure switch
	PRESSURE GOVERNOR UNIT
11	Manual valve
12	Pressure governor
13	Needle valve
14	Pressure gauge
	DAILY TANK
15	Daily tank
16	Electrical resistor
17	Heating device
18	Pressure gauge
19	Thermometer
20	High pressure switch
21	Low pressure switch
22	Thermostat (high)
23	Thermostat (low)
24	Thermostat
25	Manual valve
26	Manual valve
	TO THE BURNER
27	Degassing bottle
28	Manual valve
29	Filter (supplied loose with the burner)
30	Solenoide valve
31	Safety valve
32	One-way valve

PART III: OPERATION

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

IN THE EVENT OF A BLOCKAGE, THE CAUSE MUST BE ASSESSED. IF THE FLAME BACKFIRE WARNING LIGHT IS ON, IT IS IMPERATIVE TO CHECK THE INTEGRITY AND GOOD CONDITION OF THE COMBUSTION HEAD AS DESCRIBED IN THE MAINTENANCE SECTION BEFORE UNLOCKING THE APPLIANCE.

LIMITATIONS OF USE

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

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

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

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

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

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

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

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

ADJUSTMENTS FOR OIL OPERATION

Before starting up the burner, make sure that the return pipe to the tank is not obstructed. Any obstruction would cause the pump seal to break.

ATTENTION: **before starting the burner up, be sure that the manual cutoff valves are open. Be sure that the mains switch is closed.**

(First) Start-up preliminary operations - oil 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 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 "MAN/AUTO" selector to position "0".
8 Select the fuel using the fuel selector on the front of the panel (if any)
9 Check the phase and neutral position is correct
10 Check the sense of rotation of the electrical motors
11 Ensure the pressure on the oil ring is not excessive for the oil pump and items of the burner.
12 Ensure the oil minimum supply pressure and temperature equal at least the values provided for in the specifications of the installed pump
13 Run the oil pump using the CP meter (see pictures) to load the circuit, if there is no fuel supply ring. For any advice, see the pump chapter.
14 Bleed the line, getting rid of all the air in the pipe. Adjust the pump plug during priming and on the pre-heating tank (if any), so that the resistors are not damaged. For any advice, see the pump chapter.

DANGER! Venting the air from the oil line can also be accompanied by oil leakage, with the consequent risks for the operator and the surrounding devices. Use appropriate caution.

Oil thermostat adjustment

Progressive and fully modulanting oil burners are equipped with electronic multi-thermostat Danfoss MCX, whose operation is controlled by thyristor. (for details refer to the attached technical documentation)



Fig. 14 - Danfoss MCX

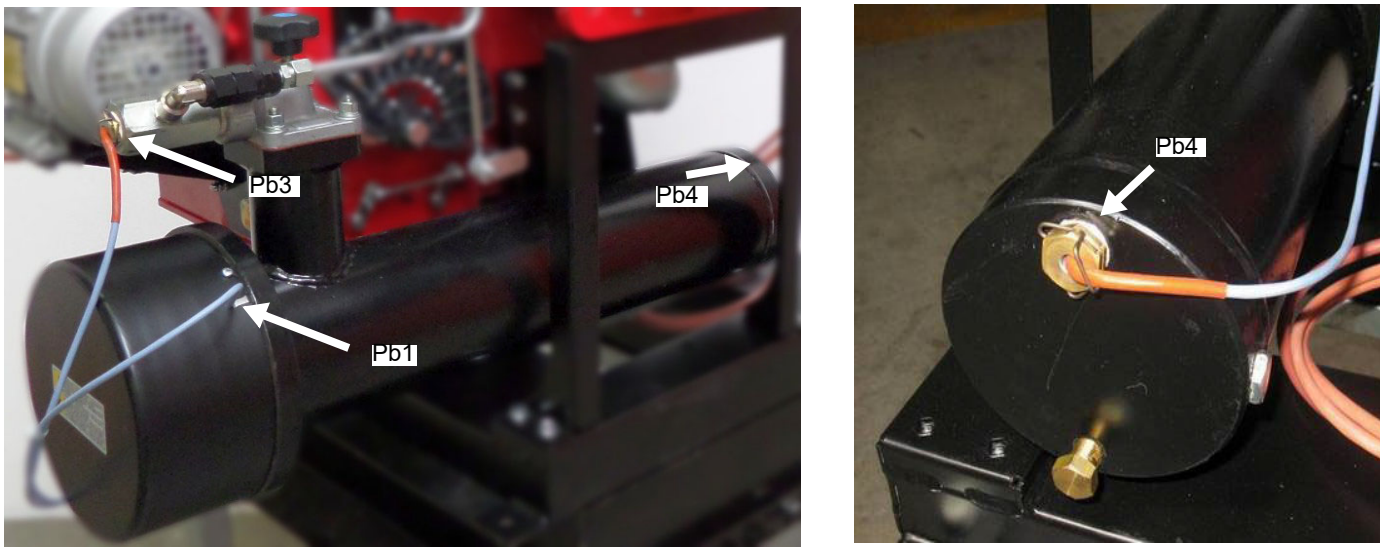


Fig. 15 - Probe connections (Danfoss MCX)

Burners equipped with double tank

The first oil tank resistance is controlled by menas thermostats according to the below scheme. All thermostats are located inside the control panel. To set the temperature use a small screwdriver. The second oil tank is controlled by “MCX” electronic thermostat.

Such temperature must be set during burner operation, checking temperature in the thermometer mounted on the pre-heating tank. We suggest a thermometer with scale up to 200° C.

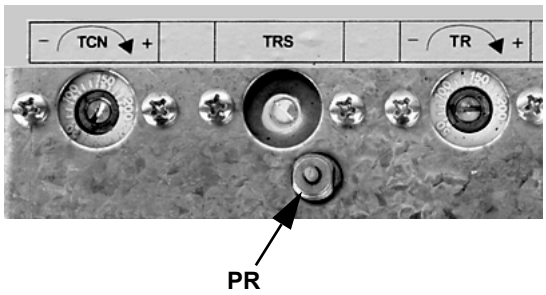
Adjust this thermostat to the correct value according to the viscosity-temperature diagram and check the temperature by using a thermometer with a scale of up to 200° C mounted on the pre-heating tank.

Safety resistors thermostat TRS: it is factory preset and sealed. Don not modify it!

When the set temperature is exceeded, check the reason and reset it by means of the push button PR

Resistor thermostat TR: check the best atomising oil temperature and set it on TR.

Thermostat TCN (it gives the enabling signal to the oil N.C. valve): set TCN at about



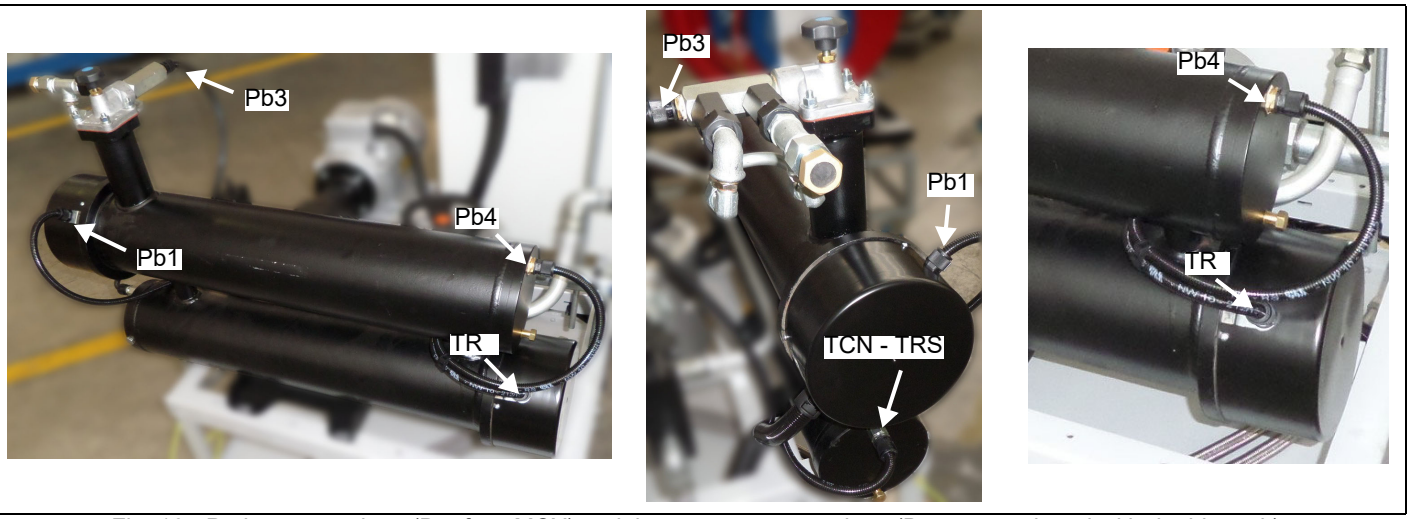


Fig. 16 - Probe connections (Danfoss MCX) and thermostats connections (Burners equipped with double tank)

The oil viscosity at the nozzle, should be about 1,5 °E, which guarantees correct and safe functioning of the burner. The above temperature values are suggested and refer to a plant designed according to the prescriptions in the burner user manual.The suggested values can change in reference to the fuel oil specifications.

Menu path				Oil viscosity at 50 °C according to the letter shown in the burner model				
				P	N	E	D	H
				89 cSt	< 50 cSt	> 50 cSt < 110 cSt	> 110 cSt < 400 cSt	> 400 cSt < 4000 cSt
				12 °E	< 7°E	> 7 °E < 15 °E	> 15 °E < 50 °E	> 50 °E < 530 °E
Par								
rEG	Pb1	tr	Oil heater temperature probe	parameter not visible				
	Pb2	tCI	Plant consent temperature probe (when installed)	20 °C	70 °C	70 °C	70 °C	---
	Pb3	Oil	Oil heater output temperature probe (PID regulation);	60-70 °C	110-120 °C	120-130 °C	130-140 °C	140-150 °C
		SP0	Set-point oil heater with oil pump stopped (stand-by)	45 °C	120 °C	130 °C	140 °C	150 °C
	Pb4	tcn	Oil heater consent temperature probe	40 °C	100 °C	100 °C	110 °C	120 °C
		trS	Safety temperature tank resistors (manual reset)	120 °C	190-200 °C	190-200 °C	190-200 °C	190-200 °C

The oil flow rate can be adjusted choosing a nozzle that suits the boiler/utilisation output and setting the delivery and return pressure values according to the ones quoted on the following charts.

NOZZLE	DELIVERY PRESSURE bar
FLUIDICS WR2 / UNIGAS M3	25

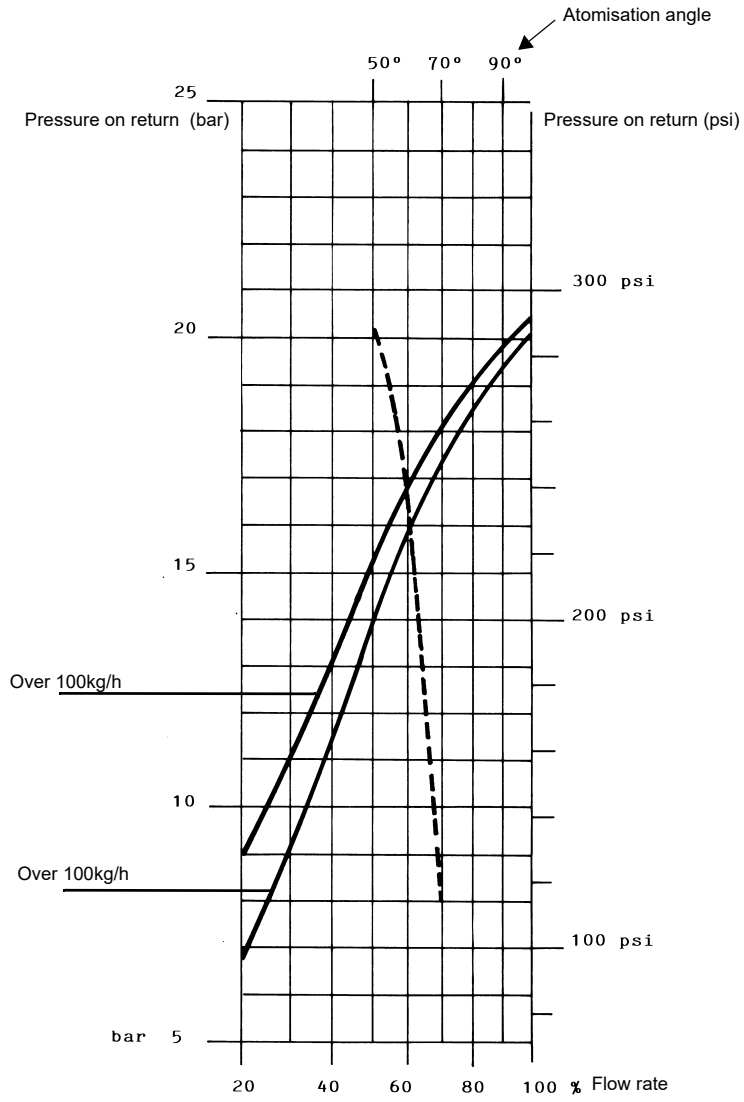
Adjustment procedure for light oil operation

The light oil flow rate can be adjusted choosing a by-pass nozzle that suits the boiler/utilisation output and setting the delivery and return pressure values according to the ones quoted on the table below and the diagram on Fig. 20 (as far as reading the pressure values, see next paragraphs).

FLUIDICS W2, WR2 NOZZLE: REFERENCE DIAGRAM (INDICATIVE ONLY)

	FLOW RATE kg/h	
DIMENSIONS	Min	Max
40	13	40
50	16	50
60	20	60
70	23	70
80	26	80
90	30	90
100	33	100
115	38	115
130	43	130
145	48	145
160	53	160
180	59	180
200	66	200
225	74	225
250	82	250
275	91	275
300	99	300
330	109	330
360	119	360
400	132	400
450	148	450
500	165	500
550	181	550
600	198	600
650	214	650
700	231	700
750	250	750
800	267	800

Tab. 3



NOZZLE SUPPLY PRESSURE = 25 bar

- - - - - - - - Atomisation angle according to the return pressure

_____ % Flow rate

ATTENTION! To achieve the maximum flow rate close completely the return line.

ADJUSTMENTS FOR GAS OPERATION

Air flow and gas adjustment

- startup the burner by selecting GAS by means of the switch on the burner control panel
- Adjust the air and gas flow rates, in according to the “air/gas ratio” curvepoints setting procedure on the LMV manual,. Check continuosly, the flue gas analisys, to avoid combustion with air excess.
- Once the butterfly valve is completely opened, acting on the pressure stabiliser of the valves group, adjust the **gas flow rate in the high flame stage** as to meet the values requested by the boiler/utilisation:
- If necessary, change the combusiton head positionl.
- The air and gas flow rate are now adjusted at the maximum power stage: go on with the point to point adjustement, as to reach the minimum output
- Adjust the pressure switches

(First) Start-up preliminary operations - gas supply

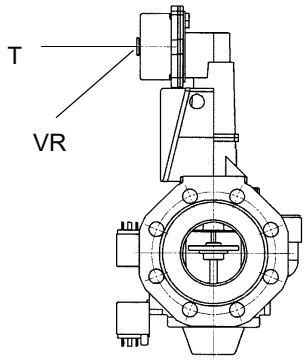
Recommended actions to be carried out in sequence:

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.

Gas valves Siemens VGD - Version with SKP2.(provided with 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.



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 of low gas pressure switch

With the burner operating at maximum power, increase the regulation pressure by slowly turning the control knob clockwise until the burner stops, taking care it does not go into lockout and the display shows the error "**Err c20 d0**".

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 of air pressure switch

To calibrate the air pressure switch, proceed as follows:

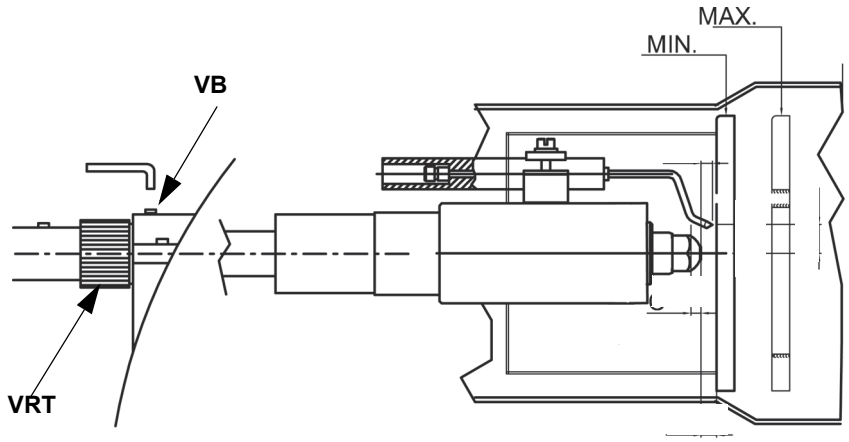
- Remove the transparent plastic cap.
- Once air and fuel setting have been accomplished, startup the burner.
- During the pre-purge phase o the operation, turn slowly the adjusting ring nut **VR** in the clockwise direction (to increase the adjusting pressure) until the burner lockout, then read the 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 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.

Setting the combustion head position

Only if necessary, change the combusiton head position: to let the burner operate at a lower output, loose the **VB** screw and move progressively back the combustion head towards the MIN position, by turning clockwise the **VRT** ring nut. Fasten **VB** screw when the adjustment is accomplished.



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

AIR FLOW AND FUEL ADJUSTMENT

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.

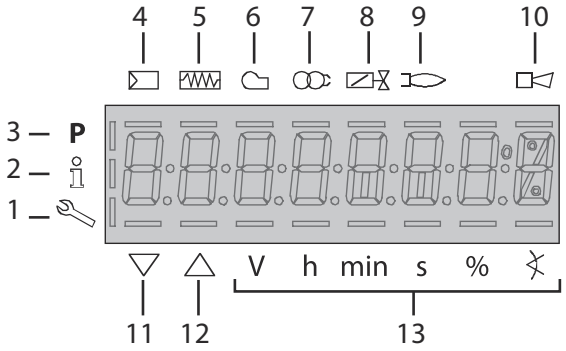
The heavy oil flow rate can be adjusted choosing a nozzle that suits the boiler/utilisation output and setting properly the delivery pressure values.

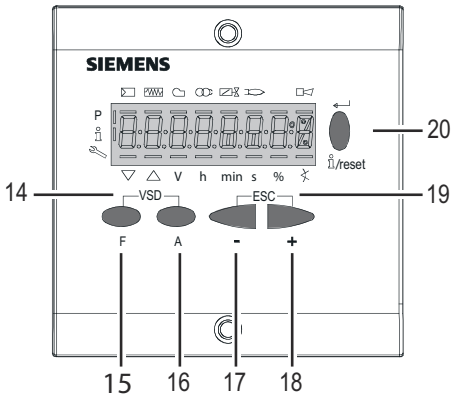
WARNING! During commissioning operations, do not let the burner operate with insufficient air flow (danger of formation of carbon monoxide); if this should happen, make the fuel decrease slowly until the normal combustion values are achieved.
WARNING! the combustion air excess must be adjusted according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

Recommended combustion parameters		
Fuel	Recommended (%) CO_2	Recommended (%) O_2
Natural gas	9 ÷ 10	3 ÷ 4.8
Heavy oil	11 ÷ 12.5	4.2 ÷ 6.7

User interface

The AZL2x.. display is shown below:
The keys functions are the following:





1 Service mode
2 Info mode
3 Parametere setting mode
4 Plant heat request
5 Oil pre-heater energised
6 Fan motor energised
7 Ignition transformers energised
8 Open valves
9 Flame
10 Lock+unlock codes
11 Closing actuator
12 Opening actuator
13 Unit measure
14 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.
15 Key **F**Used to adjust the “fuel” actuator position (**F**uel):
While pressing the **F** key, the “fuel” actuator position can be changed by means of the **+** and **-** keys.
16 Key **A** (**A**ir):
Used to adjust the “air” actuator position
While pressing the **A** key, the “air” actuator position can be changed by means of the **+** and **-** keys.
17 Key **-**Key -
Used to decrease a a value
Used to enter Info and Serivce during the curve adjustments
18 Key **+**Key +
Used to increase a a value
Used to enter Info and Serivce during the curve adjustments
19 Keys (+ & -)= ESC
By pressing + and - at the same time, the ESCAPE function is perfo-med: to enter a lower level menu
20 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

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)

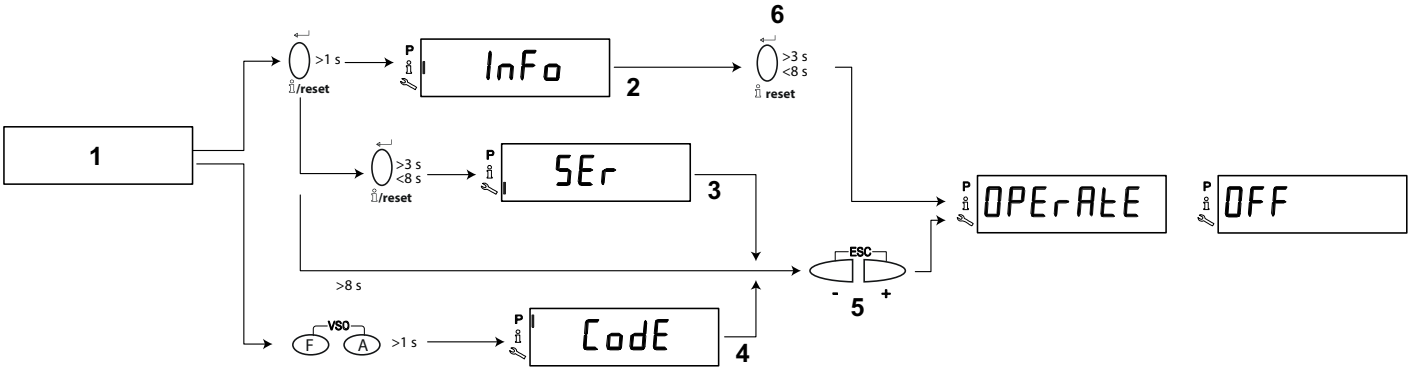
PHASES LIST

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 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 = 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 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:



1 4
2 5
3 6

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

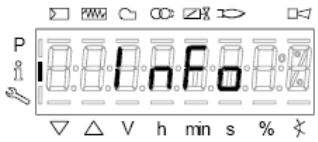
Info level

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.

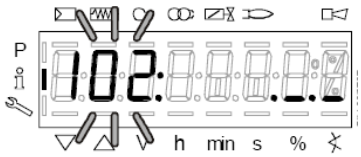
4 If a dot-line is shown on the right, there is no enough room for complete visualisation: press **enter** again the data will be completely shown for 1 to 3 seconds. By pressing **enter** or **+** and**-** at the same time, the system will exit the parameter visualisation and go back to the flashing number.

The **Info** level shows some basic parameters as:

Para-meter	***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)

Para-meter	***Description***
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



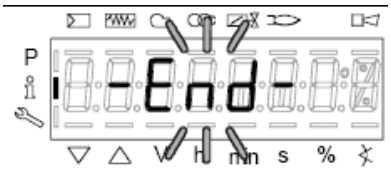
the display shows parameter **102** flashing on the left and characters **._._** on the right.

6 press InFo for 1-3 seconds: the date will appear

7 press InFo to go back to parameter “102”

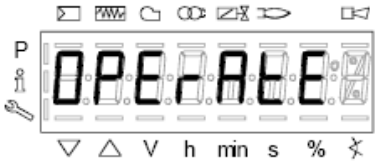
8 by pressing + / -, it is possible to scroll up/down the parameter list (see table above), or, by pressing ESC or InFo for more seconds, the display will show

9 Once the last parameter is accessed (143) by pressing **+** , the **End** message will flash.



10 Press **InFo** 

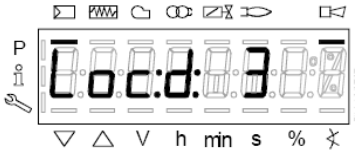
for more than three seconds or for more than three seconds orto return to the normal display.



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



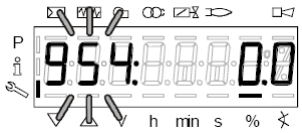
To reset, press InFo for a second. Record the codes and check the Error List to find the type of faults.

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



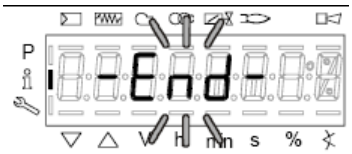
The service level shows all the information about flame intensity, actuators position, number and lock codes:

Parameter	*Description*
954	Flame intensity
121	% output, if set = automatic operation
922	Actuators position, 00=combustibile; 01= aria
161	Lock-outs number
701..725	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** for more than three seconds or for more than three seconds orto return to the normal display.



For further nformation, see tha LMV2 related manual.

OPERATION

⚠	ATTENTION: BEFORE STARTING THE BURNER UP, BE SURE THAT THE MANUAL CUTOFF VALVES ARE OPEN AND CHECK THAT THE PRESSURE VALUE UPSTREAM THE GAS TRAIN MATCHES THE VALUE ON PARAGRAPH "TECHNICAL SPECIFICATIONS"). CHECK THAT THE MAINS SWITCH IS CLOSED. CAREF

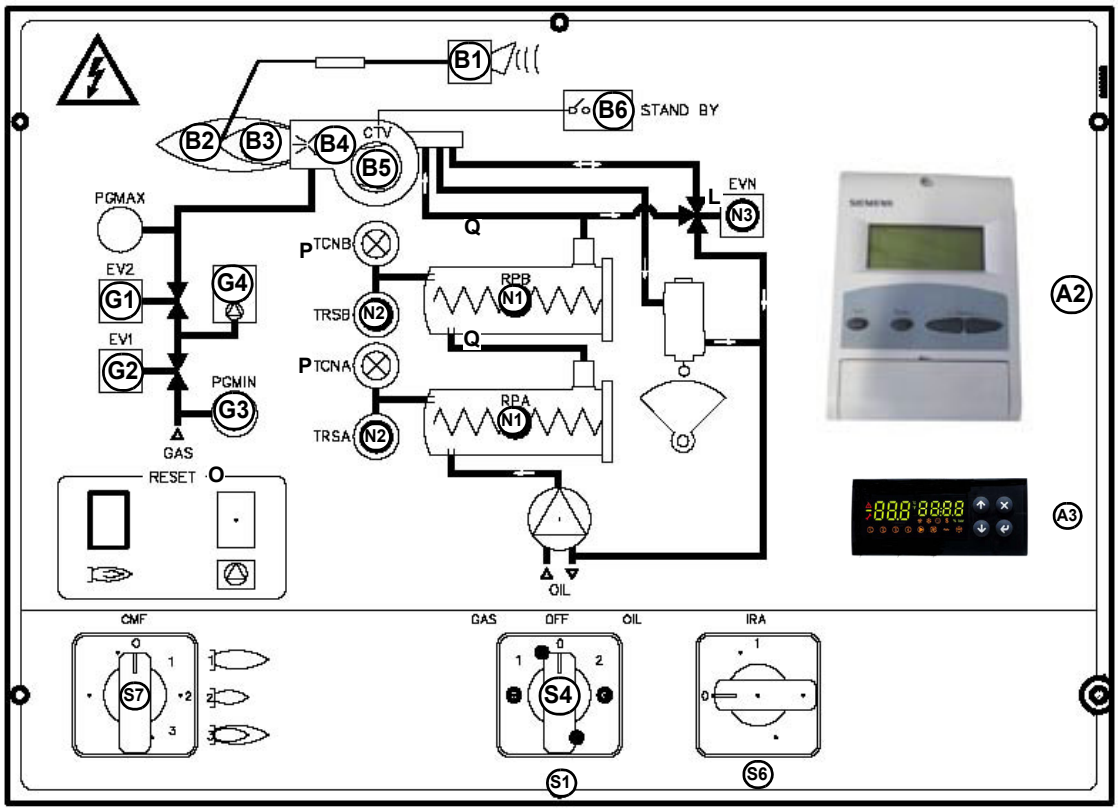


Fig. 17 - Burner front panel

Keys

B1 Lock-out LED
B2 Hi-flame operation LED
B3 Lo-flame operation LED
B4 "Ignition transformer operation" LED
B5 "Fan motor overload tripped" LED
B6 Stand-by signalling LED
G1 "EV2 opening" LED
G2 "EV1 opening" LED
G3 "Gas pressure switch signal " LED
G4 Gas proving system lockout signalling LED
S1 Main switch
S4 Fuel selection
S6 Auxiliary resistors switch
S7 CMF switch - fully modulating burners only
O4 Oil pump in operation LED
N1 Pre-heating oil tank
N2 Pre-heating resistors safety thermostat
N3 Oil solenoid valve operation
A1 Burner Modulator (only on fully modulating burners)
A3 Regulation thermostat for pre-heating oil resistors

- Choose the type of fuel by turning the switch, on the burner control panel.
  CAUTION: if the fuel chosen is oil, be sure the cutoff valves on the feed and return pipes are open.
- Check the control box is not locked; if so, reset it by means of the reset LMV button.
- Check the series of thermostats and pressure switches allow the burner to start.

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Gas operation

The gas minimum pressure switch, installed upstream from the safety valves, ensures the network distributes the gas at a pressure suitable to switch on the machine start cycle.
In compliance with the regulations in force, the cycle starts with the pre-ventilation phase.

(Burners fitted with gas proving system). The gas safety valves proving system can be executed during this phase and/or at the burner shut-off, according to the device setting. Failing which a safety interlock is tripped.

The fan starts and the air damper, driven by the servomotor, opens as far as the high flame position. The air pressure switch, detecting a pressure, ensures the fan's operation. Failing which a safety interlock is tripped.
At the end of preventilation, in sequence, the burner management system moves the servomotor to the ignition position, supplies the ignition transformer and orders the opening of the gas safety valve group.
The gas from the net passes through a filter, the double safety valves and the pressure regulator. The regulator holds the gas head pressure within the use limits.
Fuel and comburent are channelled separately till they meet in the flame development area (combustion chamber) where the spark, discharged by the ignition electrodes located on the burner's head, must ignite the flame in a safety time of less than 3 s, as provided for by the reference regulations.
The flame is detected by a sensor that can be an ionization or UV or IR sensor. Failing which a safety interlock is tripped. From now on flame detection will be continuous, until the burner is switched off.
At the end of the safety time, the control unit de-energizes the ignition transformer, moving the servomotor to the low or high flame position according to system demand.
The burner operation is now controlled by the modulator, if any, or by the boiler controller (i.e.: high-low flame thermostat).
The dedicated actuators move, simultaneously and proportionally, the air damper, the fuel butterfly valve, the head position (if the burner include this option) and the VSD optimizing exhaust gas values and obtaining efficient combustion.

The position of the combustion head, set manually or automatically (if the option is included in the supply), contributes to adjust the burner's output.
If the monitored variable (pressure or temperature) of the boiler/generator/oven fluid exceeds a preset value, the machine switch-off phase is started. The flame control unit moves the servomotor to the low flame position (minimum power supplied), closes the safety valves and starts the post-ventilation phase, if any.
At the end of this stage, the burner remains in stand-by waiting for a new start-up sequence



For further details, see the attached equipment manual.

Heavy Oil operation

The supply and atomization temperature is a variable that must be carefully determined for the burner to work correctly.
A temperature probe controls the oil input temperature into the machine and enables the ignition cycle start-up phase when the fuel reaches a temperature allowing it to be pumped.
Another temperature probe or temperature switch (in reference to the supply), if any, checks the temperature on the oil return line to the tank and enables the ignition phase.
In compliance with the regulations in force, the cycle starts with the pre-ventilation phase. The fan starts and the air damper, driven by the servomotor, opens. The air pressure switch, detecting a differential pressure, ensures the fan's operation. Failing which a safety interlock is tripped.
During the pre-ventilation phase, the pump makes the fuel oil circulate in the machine hydraulic circuit. The fuel passes through a filter before entering into the pre-heating tanks, one or two according to the size of the burner, warming up before going back to the supply circuit.
The pre-ventilation phase can then be completed and the ignition phase started. In sequence, the burner management system (BMS) moves the servomotor to a suitable position, supplies the ignition transformer and the valves allowing the nozzle to spray the oil into the combustion chamber, where it will mix with the comburent air.
A PID thermoregulator, monitoring with two probes the oil temperature on both entering and exiting the electrical pre-heaters, ensures the oil reaches the nozzle at such a temperature as to allow the burner to switch on safely.
The spark between the ignition electrodes on the burner head must ignite the flame in a safety time not exceeding 5 s, as provided for by the reference regulations.
The presence of the flame is detected by UV or IR sensor. Failing which a safety interlock is tripped.
From now on flame detection will be continuous, until the burner is switched off.
At the end of the safety time, the control unit de-energizes the ignition transformer, moving the servomotor to the low or high flame position according to system demand.
The burner operation is now controlled by the modulator, if any, or by the boiler controller (i.e.: high-low flame thermostat).
The dedicated actuators move, simultaneously and proportionally, the air damper, the fuel butterfly valve, the head position (if the burner include this option) and the VSD optimizing exhaust gas values and obtaining efficient combustion.
At the same time, the fuel oil PID thermoregulator keeps the temperature of the oil to the nozzle constant for the whole working curve, guaranteeing the best possible nebulization. This, combined with an optimal air/fuel ratio, allows optimizing exhaust gas values and obtaining efficient combustion.
The position of the combustion head contributes to adjust the power supplied.
If the monitored variable (pressure or temperature) of the boiler/generator/oven fluid exceeds a preset value, the machine switch-off phase is started. The flame control unit moves the servomotor to the low flame position (minimum power supplied), closes the safety valves and starts the post-ventilation phase, if any.
At the end of this stage, the burner remains in stand-by waiting for a new start-up sequence. The oil pre-heating tank/s maintain(s) a temperature suitable to the quick re-ignition of the machine in this phase too.

PART IV: MAINTENANCE

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

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

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

ROUTINE MAINTENANCE

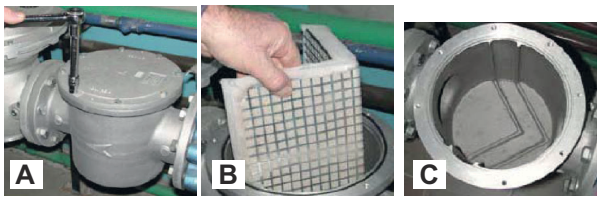
- Clean and examine the gas filter cartridge and replace it if necesssary;
- Remove and clean the combustion head;
- Examine and clean the ignition electrodes, adjust and replace them if necessary;
- Examine and clean the detection electrode/photoelement (according to the burner models), replace it if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

DANGER! Incorrect motor rotation can seriously damage property and injure people.
ATTENTION: when servicing, if it was necessary to disassemble the gas train parts, remember to execute the gas proving test, once the gas train is reassembled, according to the procedure imposed by the law in force.

Gas filter maintenance

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.



Thecnical procedure of self cleaning filters substitution (valid for all models)

1 Close the bowl valve before the self cleaning filter
2 Switch off any electrical equipment on board on the filter (example motorization or heaters)

WARNING! Drain the system by unscrewing the drain screw on the bottom of the self cleaning filter

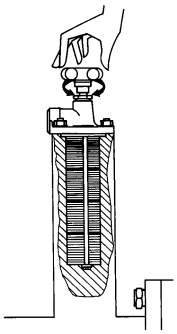
3 Disconnect the outlet pipe from the cover of the self cleaning filter
4 Remove the cover with all the filter pack, leaving only the bowl on the line
5 Clean any residue on the bottom of the bowl and clean the seat of the O-ring seal

WARNING! Replace the O-ring seal between the bowl and cover

6 Insert the filter pack again making sure to respect the correct inlet/outlet direction or any references on the cover and tray
7 Replace the filter by following the reverse order operations
8 Make sure there is no leakage and give the power to any electrical equipmente on the filter

Self-cleaning filter

Fitted only on high viscosity oil burners. Periodically turn the knob to clean the filter.

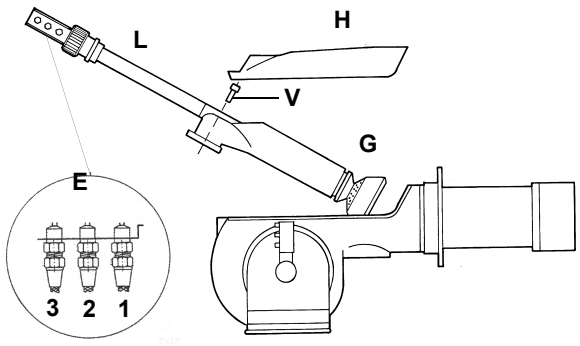


Removing the combustion head

1 Remove the top **H**.
2 Remove the **UV** detector out of its housing: disconnect electrode cables and the light oil flexible hoses.
3 Loosen the screws **V** holding the gas manifold **G**, loosen the connectors **E** and remove the assembly as shown.

Note: to replace the combustion head, reverse the operations described above.

4 Clean the combustion head by means of a vacuum cleaner; scrape off the scale by means of a metallic brush.

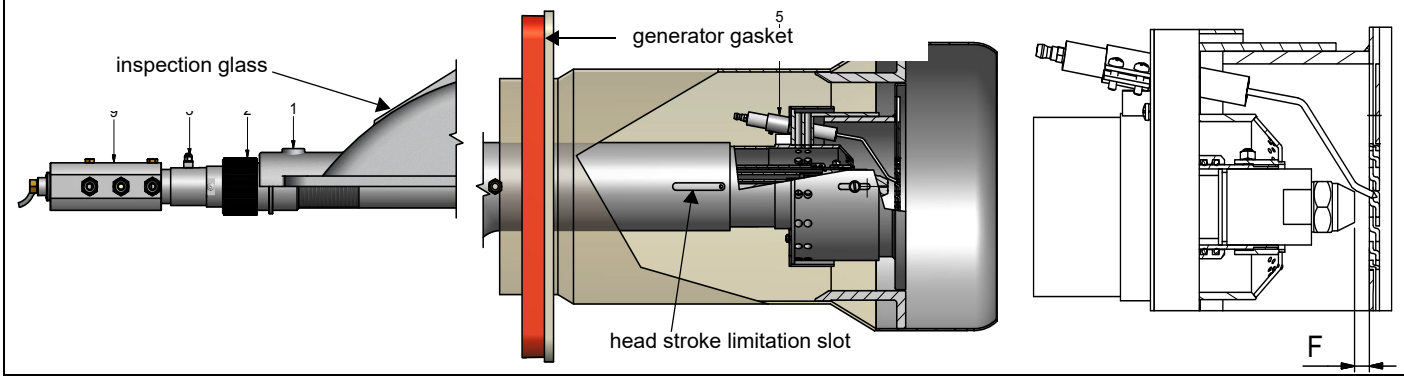


Key
1 Inlet
2 Return
3 Gun opening
E Oil piping connections
H Cover
L Oil gun

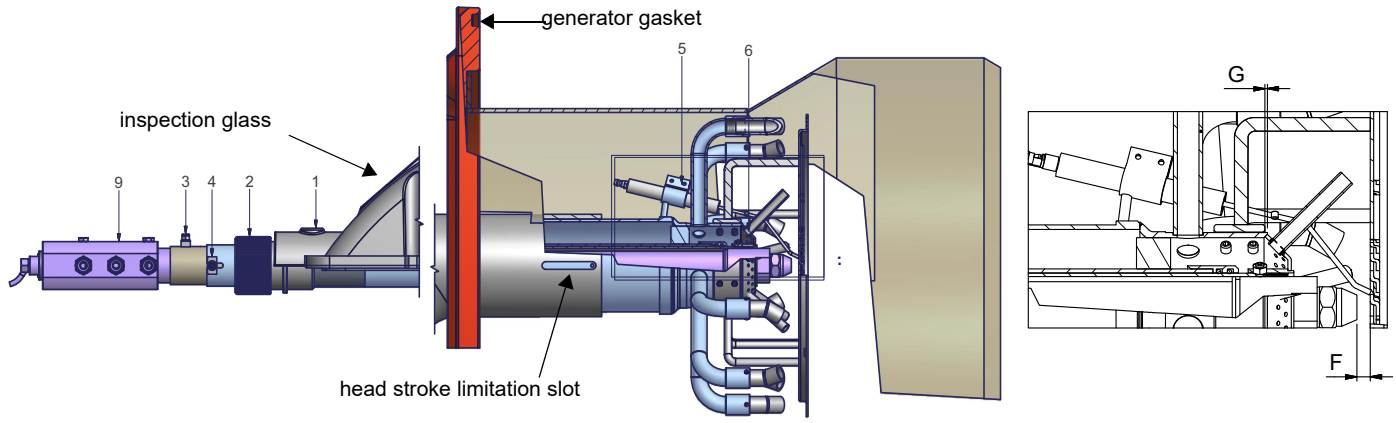
Adjusting the electrodes position

Adjust the electrodes position, according to the measures (in mm) shown on the next picture.

SERIE HR9x



SERIE HR5x



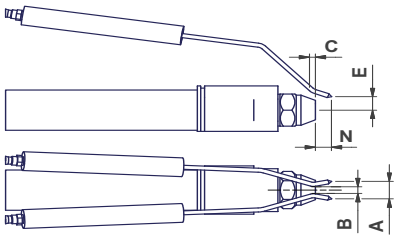
1 Move the combustion head “all-ahead” by the “head stroke limitation cam”, acting on the ring nut **2**; fix it by means of screw 1;

2 place the gas plate "**6**" according to measure **G** *(gas plate opening)* - (see table below) - acting on screw "**4**"

3 place the nozzle to "**F**" mm (see table below) from the diffuser disc, acting on screw "**3**"

4 place the electrodes according to measures **E**,**B**,**N** (see table below) acting on screw"**5**" (if the case, correct the measure, by deforming the electrode wire).

.

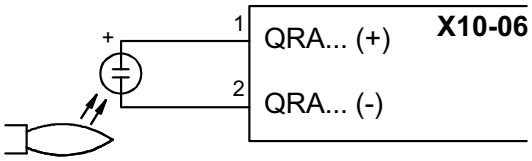


G	A	B	C	E	F	N
0	10÷15	3÷5	3÷4	10÷13	8÷10	10÷13

3.1 Checking the detection current

To check the detection signal follow the scheme in Fig. 31Fig. 22. 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%)



Flame detection probe

To clean/replace the detection photocell, proceed as follows:

1 Disconnect the system from the electrical power supply.
2 Shut off the fuel supply;
3 remove the photocell from its slot (see next figure);
4 clean the bulbe if dirty, taking care not to touch it with bare hands;
5 if necessary, replace the bulb;

replace the photocell into its slot.



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

TROUBLESHOOTING *Heavy oil operation*

	THE BURNER DOESN'T START	THE BURNER REPEATS PRE-PURGE	NOISY FUEL PUMP	THE BURNER DOESN'T START AND STOPS	THE BURNER STARTS AND STOPS	THE BURNER DOESN'T SWITCH TO HIGH FLAME	THE BURNER STOPS DURING OPERATION	THE BURNER STOPS AND REPEATS THE CYCLE DURING OPE-RATION
MAIN SWITCH OPEN	●							
LINE FUSE INTERVENTION	●							
MAX. PRESSURE SWITCH FAULT	●							●
FAN THERMAL CUTOUT INTERVENTION	●							
AUXILIARY RELAIS FUSES INTERVENTION	●							
CONTROL BOX FAULT	●	●		●	●		●	
SERVOCONTROL FAULT						●		
SMOKEY FLAME					●		●	
IGNITION TRANSFORMER FAULT				●				
IGNITION ELECTRODE DIRTY OR WRONG POSITIONED				●				
DIRTY NOZZLE				●			●	
FUEL SOLENOID VALVE DEFECTIVE				●			●	
PHOTORESISTOR DIRTY OR DEFECTIVE					●		●	
HI-LO FLAME THERMOSTAT DEFECTIVE						●		
WRONG POSITION OF SERVOCONTROL CAMS						●		
FUEL PRESSURE TOO LOW				●				
DIRTY FUEL FILTERS			●	●			●	

*Gas operation*TROUBLESHOOTING

CAUSE	TROUBLE										
	THE BURNER DOESN'TSTART	CONTINUE WITH PRE-PURGE	DOESN'T START AND LOCK-OUT	DOESN'T START AND REPEATS THE CYCLE	STARTS AND REPEATS THE CYCLE	STARTS AND LOCK-OUT	THE FLAME MONITOR DEVICE DOESN'T GIVECON-SENT TO START	DOESEN'T SWITCH TO HIGH FLAME	DOESEN'T RETURN IN LOW FLAME	LOCK-OUT DURING OPERATION	TTURNS OF AND REPEATS CYCLE DURING OPERA-TION
MAIN SWITCH OPEN	●I	●	●	●	●	●	●	●	●	●	●
LACK OF GAS	●I	●	●	●I	●	●	●	●	●	●	●
MAXIMUM GAS PRESSURE SWITCH DEFEC-TIVE	●I	●	●I	●	●	●	●	●	●	●	●
THERMOSTATS/PRESSURE SWITCHES DEFECTIVES	●I	●	●	●I	●	●	●	●	●	●	●I
OVERLOAD TRIPPED INTERVENTION	●I	●	●	●	●	●	●	●	●	●	●
AUXILIARIES FUSE INTERRUPTED	●I	●	●	●	●	●	●	●	●	●	●
DEFECTIVE CONTROL BOX	●I	●	●	●	●	●I	●	●	●	●	●
DEFECTIVE ACTUATOR	●I	●	●	●	●	●	●	●	●	●	●
AIR PRESSURE SWITCH FAULT OR BAD SETTING	●I	●	●	●	●	●I	●	●	●	●	●
MINIMUM GAS PRESSURE SWITCH DEFEC-TIVE OR GAS FILTER DIRTY	●I	●	●	●I	●	●	●	●	●	●	●
IGNITION TRANSFORMER FAULT	●	●	●	●	●	●	●	●	●	●	●
IGNITION ELECTRODES BAD POSITION	●	●	●	●	●	●	●	●	●	●	●
BUTTERFLY VALVE BAD SETTING	●	●	●	●	●	●	●	●	●	●	●
DEFECTIVE GAS GOVERNOR	●	●	●	●I	●I	●	●	●	●	●	●
GAS VALVE DEFECTIVE	●	●	●	●	●	●	●	●	●	●	●
BAD CONNECTION OR DEFECTIVE HIGH/ LOW FLAME THERMOSTAT OR PRESSURE SWITCH	●	●	●	●	●	●	●	●	●	●	●
ACTUATOR CAM WRONG SETTING	●	●	●	●	●	●	●	●	●	●	●
UV PROBE DIRTY OR DEFECTIVE	●	●	●	●	●	●	●	●	●	●	●



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

AZL2x - LMV2x/3x
Burner Management System



Service manual

M12916CD Rev. 3.4 03/2023

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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 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 cut-out 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

-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

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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

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

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

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

SYMBOLS USED



WARNING!

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



DANGER!

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

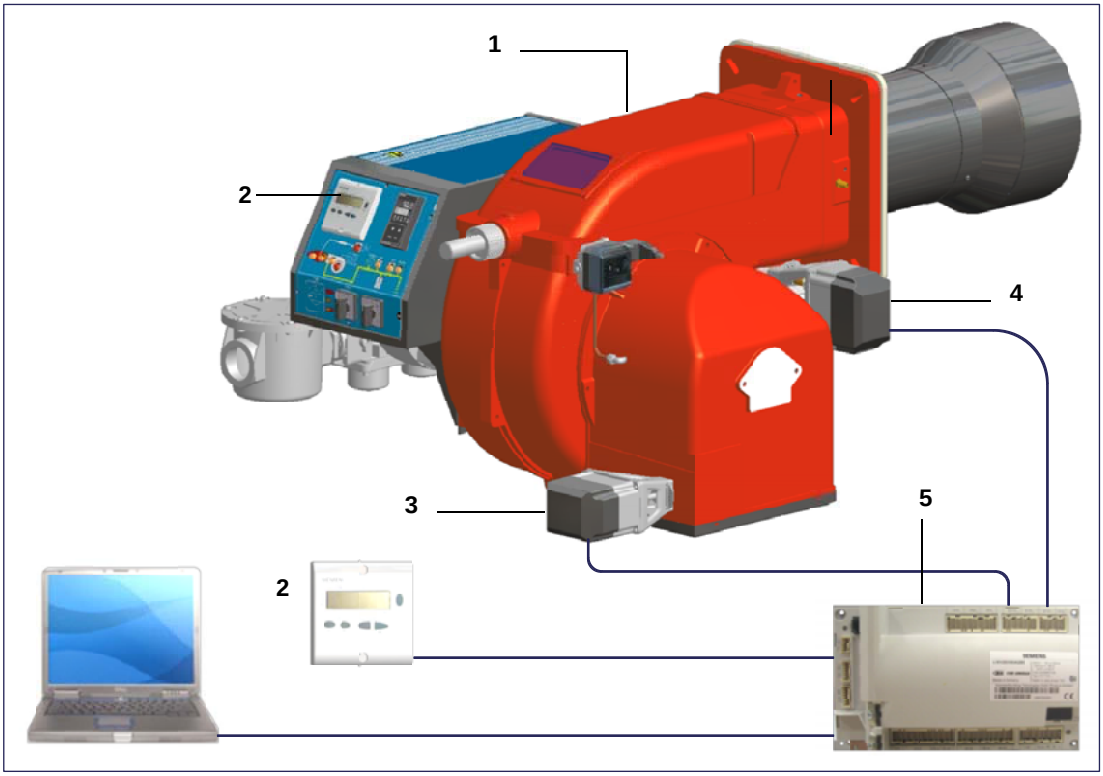


WARNING!

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

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.

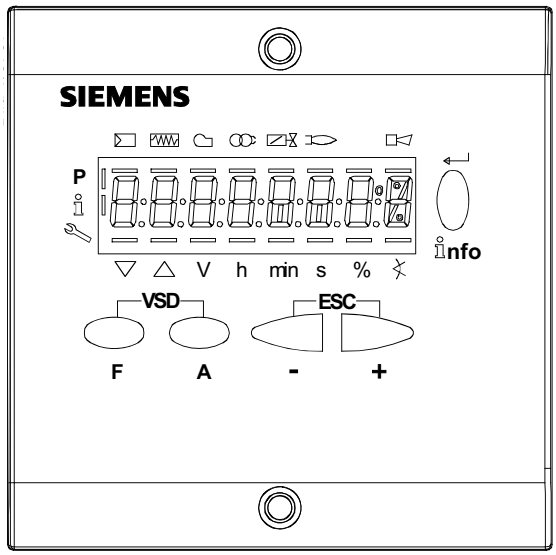


Keys

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 (**F**uel): :

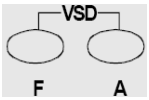
While pressing the **F** key, the “fuel” actuator position can be changed by means of the **+** and **-** keys.



Key A

Used to adjust the “air” actuator position (**A**ir):

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

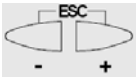
Used to enter Info and Serivce during the curve adjustments



+Key +

Used to increase a a value

Used to enter Info and Serivce during the curve adjustments

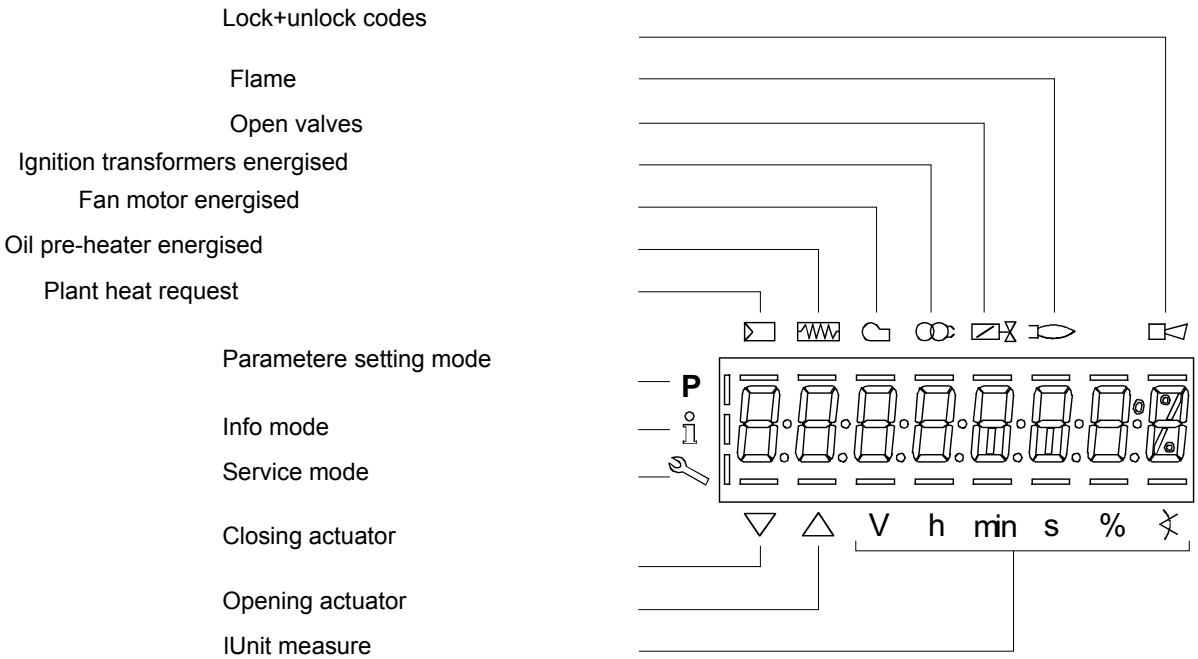


Keys (+ & -)= ESC

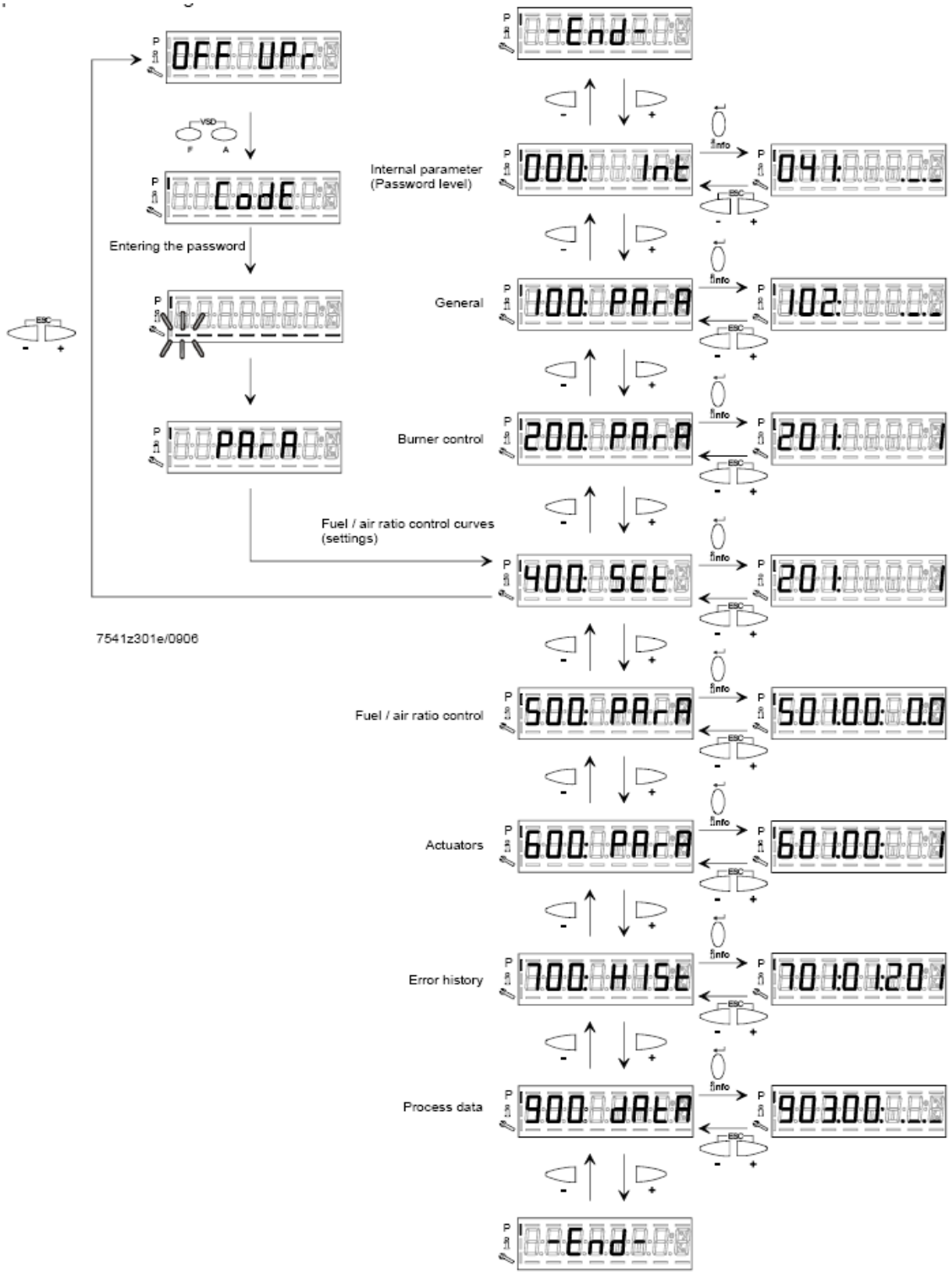
By pressing + and - at the same time, the ESCAPE function is perfomed:

to enter a lower level menu

The display will show these data:



Parameters level (heating engineer)



7541z301e/0906

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 bruciatore)	Password OEM (5 characters)	OEM
050	Start backup/restore via AZL2x/PC	Start backup / restore via AZL2.../ PC software (set parameter to 1) Index 0: Create backup Index 1: Execute restore Error diagnostics 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	x	x	x
103	Numero identificativ	Identification number	Service / Info	x	x	x
104	Set di parametri preimpostati: codice cliente	Preselected parameter set: customer code	Service / Info	x	x	x
105	Set di parametri preimpostati: versione	Preselected parameter set: version	Service / Info	x	x	x
107	Versione softwar	Software version	Service / Info	x	x	x
108	Variante software	Software variant	Service / Info	x	x	x
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

125	Frequenza di rete 0 = 50 Hz 1 = 60 Hz	Mains frequency 0 = 50 Hz 1 = 60 Hz	Service / Info	x	x	x
126	Luminosità display	Display brightness	Service / Info	x	x	x
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	x
142	Tempo d'arresto in caso di guasto di comunicazione	Setback time in the event of communication breakdown	OEM / Service		x	x
143	Riserva	Reserved	Service / Info		x	x
144	Riserva	Reserved	OEM / Service		x	x
145	Indirizzo dispositivo per Modbus	Device address for Modbus	OEM / Service		x	x
146	Velocità di trasmissione per Modbus	Baud rate for Modbus	OEM / Service		x	x
147	Parità per Modbus	Parity for Modbus	OEM / Service		x	x
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 communication with building automation For modulation operation the setting range is as fol-lows: 0…19.9 = burner off 20…100 = 20…100% burner rating For multistage operation apply to setting range: 0 = burner OFF, P1, P2, P3 Invalid = no performance standards of the building auto-mation	OEM / Service		x	x
161	Numero di avarie	Number of faults	Service / Info	x	x	x
162	Ore di esercizio (azzerabile da Service)	Operating hours (resettable by Service)	Service / Info	x	x	x
163	Ore di esercizio (con dispositivo sotto tensione)	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	x	x	x
165	Numero di partenze	Number of startups	Service / Info	x	x	x

166	Numero totale di partenze (non azzerabile)	Total number of startups	Service / Info	x	x	x
167	Volume combustibile (azzerabile da OEM)	Fuel volume (resettable by OEM)	Service / Info	x	x	x
172	Fuel 1(secondo combustibile)Ore di esercizio (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 combustibile (azzerabile da OEM)	Fuel 1: Fuel volume resettable (m^3, l, ft^3, 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 fabbrica = 2s - range impostazione: 2 - 60 s)	Fan ramp up time (default value = 2s - range: 2 - 60 s)	OEM / Service	x	x	x
212	Tempo massimo raggiungimento bassa fiamma (valore fabbrica = 45 s - range impostazione: 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 impostazione: 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	x	x	x
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	x	x	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 impostazione: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 fabbrica = 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 fabbrica = 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 fabbrica = 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 fabbrica = 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 valvola 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 intermittente 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 esclusivamente per bruciatori di gas con elettrodo di rilevazione.	Gas: Forced intermittent operation 0 = deactivated 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	x	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 impostazione:0.2s - 10s)	Gas: proving test evacuation time (default value = 3s - range:0.2s - 10s)	OEM	x	x	x

243	Gas: tempo pressione atmosferica controllo tenuta (valore fabbrica = 10s - range impostazione:0.2s - 60s)	Gas: proving test time atmospheric pressure (default value = 10s - range:0.2s - 60s)	OEM	x	x	x
244	Gas: tempo riempimento controllo tenuta (valore fabbrica = 3s - range impostazione: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 fabbrica = 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 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 successivo 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 obbligatoria la preventilazione. In ambito industriale, vedere i casi in cui la norma EN746-2 prevede la possibilità di non fare la preventilazione.	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	x	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	x	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 fabbrica = 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 fabbrica = 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 = deactivated 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	x	x	x
281	Olio: tempo iniezione olio (valore fabbr. = 1) **0** = preaccensione corta (Ph38 - fase programma 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 controller (LR)-ON	OEM / Service	x	x	x

Block 300: Burner control (only with LMV26)

Param.	Descrizione	Description	Password	LMV20 LMV27	LMV26	LMV37
301	Combustibile 1 : Modalità funzionamento bruciatore (rampa combustibile, modulante / multistadio, servocomandi, 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) **10** = olio modulante con accensione tramite pilota (LOGp mod)	Fuel 1 : 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) **10** = LoGp mod	OEM / Service		x	

	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) **15** = gas rampa Gp1 modulante pneumatico senza servomotori (Gp1 mod pneu) **16** = gas rampa Gp2 modulante pneumatico senza servomotori (Gp2 mod pneu)	**11** = LoGp 2-stage **12** = Lo mod 2 fuel valves **13** = LoGp mod 2 fuel valves **14** = G mod pneu without actuator **15** = Gp1 mod pneu without actuator **16** = Gp2 mod pneu without actuator				
	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	**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			x	
321	Combustibile 1 - Gas: sonda rilevazione fiamma attivo (valore fabbrica = 1) - **0** = QRB../QRC.. **1** = ION / QRA..	Fuel 1 - Gas: active detector flame evaluation (default value = 1) **0** = QRB../QRC.. **1** = ION / QRA..	OEM / Service		x	
322	Combustibile 1 - 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.	Fuel 1 - 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	
323	Limite ripetizioni pressostato gas di minima pressione (valore fabbrica = 16 - range impostazione:1 - 16)	Repetition limit pressure switch-min-gas (default value = 16 - range:1 - 16)	OEM / Service		x	
325	Combustibile 1 - Gas: tempo di preventilazione (valore fabbrica = 20s - range impostazione:20s - 60min)	Fuel 1 - Gas: Prepurge time (default value = 20s - range:20s - 60min)	OEM / Service		x	

326	Combustibile 1 - Gas: tempo di preaccensione (valore fabbrica = 2s - range impostazione: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 impostazione: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 impostazione: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 impostazione: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	
333	Combustibile 1 - Gas: Tempo postcombustione (valore fabbrica = 8s - range impostazione:0.2s - 60s)	Fuel 1 - Gas: postcombustion time (default value = 8s - range:0.2s - 60s)	OEM / Service		x	
334	Combustibile 1 - Gas: Tempo postventilazione (valore fabbrica = 0.2s - range impostazione: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 valvola 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 atmosferica 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 impostazione:0.2s - 60s)	Fuel 1 - Gas: proving test time gas pressure (default value = 10s - range:0.2s - 60s)	OEM		x	
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 successivo 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-ventilazione 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 obbligatoria la preventilazione. In ambito industriale, vedere i casi in cui la norma EN746-2 prevede la possibilità di non fare la preventilazione.	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 impostazione: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 impostazione:0.2s - 60min)	Fuel 1 - Oil: preignition time (default value = 2s - range:0.2s - 60min)	OEM / Service		x	
367	Combustibile 1 - Olio: tempo di sicurezza 1 (TSA1) (valore fabbrica = 5s - range impostazione: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 impostazione: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	
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 impostazione: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 postcombustione (valore fabbrica = 8s - range impostazione:0.2s - 60s)	Fuel 1 - Oil: Postcombustion time (default value = 8s - range:0.2s - 60s)	OEM / Service		x	
374	Combustibile 1 - Olio: Tempo postventilazione (valore fabbrica = 0.2s - range impostazione: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	

380	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		x	
381	Combustibile 1 - Olio: tempo iniezione olio (valore fabbr. = 1) **0** = preaccensione corta (Ph38 - fase programma 38) **1** = preaccensione lunga (con ventilatore) (Ph22 - fase programma 22)	Fuel 1 - 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	
384	Combustibile 1 - Olio: Tempo di post-ventilazione 3 (abortito con regolatore di potenza (LR)-ON	Fuel 1 - Oil: Postpurge time 3 (abortion with load controller (LR)-ON	OEM / Service		x	

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 “Impostazione 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	x	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	x	x	x
403	Curve controllo inverter (F + A): si accede alla lista dei punti da impostare (da P0 a P9) - consultare paragrafo “Impostazione curve”	Ratio control curves VSD (curve setting only)	SO		x	x
404	Combustibile 1 - Curve controllo servocomando combustibile 1 (F): si accede alla lista dei punti da impostare (da P0 a P9) - consultare paragrafo “Impostazione curve”	Fuel 1: Ratio control curves fuel actuator (curve setting only)	SO		x	
405	Combustibile 1 - Curve controllo servocomando aria (A): si accede alla lista dei punti da impostare (da P0 a P9) - consultare paragrafo “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 “Impostazione curve”	Fuel 1: Ratio control curves VSD (curve setting only)	SO		x	

Block 500: Air/fuel ratio control

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		x	x
523	Tempo rampa di discesa inverter	Ramp down	OEM / Service		x	x

542	Activation of VSD / PWM fan (PWM = Pulse-Width Modulation) 0=deactived 1=actived	Activation of VSD / PWM fan (PWM = Pulse-Width Modulation)	OEM / Service		x	x

544			Parameter 544				OEM / Service	x	x	x
			Modulation **32s**	Modulation **48s**	Modulation **64s**	Modulation **80s**				
	Actuator	Actuating speed parameter 613	Max. delta between the curve points							
	Actuator (<= 5Nm)	5s / 90°	31°	46°	62°	77°				
	Actuator **SQM33.7**	17s / 90°	**9° (1)**	13°	18°	22°				

(1) in this case the max. position of 90° can't be reached

545	Percentuale minima di carico per modulazione (valore fabbrica = n.d. - range impostazione:20%-100%)	Lower load limit (default value = n.d. - range:20%-100%)	OEM / Service	x	x	x
546	Percentuale massima di carico per modulazione (valore fabbrica = n.d. - range impostazione:20%-100%)	Higher load limite (default value = n.d. - range:20%-100%)	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 limit (default value = n.d. - range:20%-100%)	OEM / Service		x	
566	Combustibile 1 - Percentuale massima di carico per modulazione (valore fabbrica = n.d. - range impostazione:20%-100%)	Fuel 1 Higher load limite (default value = n.d. - range:20%-100%)	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 riferimento **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 servocomando **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 monitoraggio 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 standard) index 1 = air (default = 0 (riferimento standard) 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 servocomando 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° (1Nm, 1,2Nm, 3Nm) 1 = 10s / 90° (6Nm) 2 = 17s / 90° (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

645	Configurazione uscita analogica % di carico (valore fabbrica = 0) **0** = DC 0..10 V **1** = DC 2..10 V **2** = DC 0/2..10 V	Configuration of analog output (default value = 0) **0** = DC 0..10 V **1** = DC 2..10 V **2** = DC 0/2..10 V	OEM / Service	**LMV27**	x	x



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

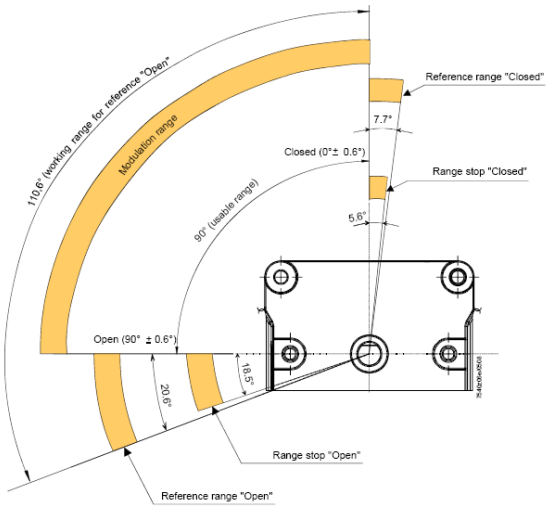
Param.	Descrizione	Description	Password
701	Storico errori: 701 - 725.01.codice	Error history: 701 - 725.01.code	Service / Info
°	Storico errori: 701 - 725.02.codice diagnostico	Error history: 701 - 725.02.diagnostic code	Service / Info
°	Storico errori: 701 - 725.03.classe errore	Error history: 701 - 725.03.error class	Service / Info
°	Storico errori: 701 - 725.04.fase	Error history: 701 - 725.04.phase	Service / Info
°	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

Block 900: Process data

Param.	Descrizione	Description	Password
903	Potenza attuale (valore fabbrica = 0% - range impostazione = 0-100%) **Indice 0** = combustibile **Indice 1** = aria	Current output (default value = 0% - range = 0-100%) **Index 0** = fuel **Index 1** = air	Service / Info
922	Posizione incrementale servocomandi (valore fabbrica = 0% - range impostazione = -50% - 150%) **Indice 0** = combustibile **Indice 1** = aria	Incremental position of actuators (default value = 0% - range = -50% - 150%) **Index 0** = fuel **Index 1** = air	Service / Info
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
945	Solo con **LMV26:** Combustibile attuale 0 = combustibile 0 1 = combustibile 1	Actual fuel 0 = fuel 0 1 = fuel 1	Service / Info
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
954	Intensità di fiamma (0% ÷ 100%); minima corrente 30% = 4µA; massima corrente100% = 16µA; massima corrente ammissibile = 40µA.	Intensity of flame (range = 0% - 100%) minimum current 30% = 4µA; maximum current100% = 16µA; maximum current possible = 40µA.	Service / Info
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°) or the OPEN position (>90°).



Param.	Descrizione	Description	Password
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

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

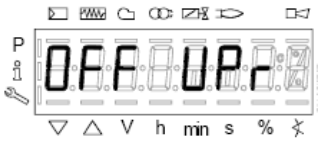
The LMV2x complete programming must be performed on units that has never been set before or reset units (e.g. spare parts).
The programming procedure is performed by setting the following main parameters:

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.

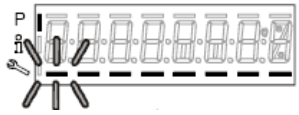
This message shows that the unit has not been programmed before or that the operating mode (fuel train) is not set yet or that the unit has not been completely programmed. Pree keys **F** (Fuel) and **A** (Air)  at the same time unitl the display shows **code** and next it will show 7 bars the first on the left is flashing. If the display shows "Off", it means that the unitis already set, then see the instructions on chapter "Adjsuting 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 untilthe display shows **code** and then a 7 digit dashed line blinking on the left.



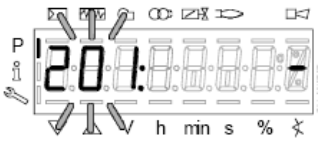


Press the "**+**" key until the first character of the password (the default password is 9876), then press **ENTER (InFo)**, the character now turn to a bar while the second bar starts flashing. Press "**+**" until the second character is entered, then press **ENTER (InFo)**.
Repeat the procedure until 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):

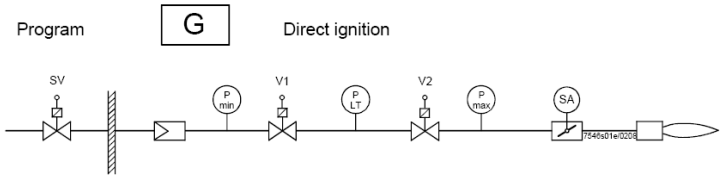


In the example, set configuration **1** = direct gas ignition (G mod).
Other possibilities are below listed:

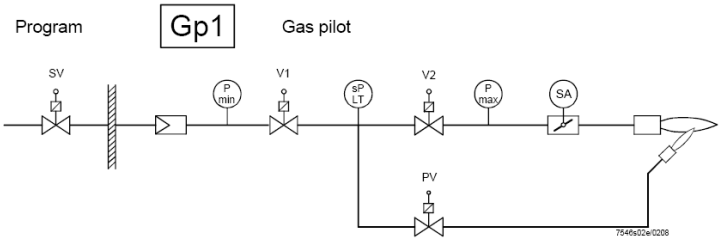
the types of fuel trains are the following:

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

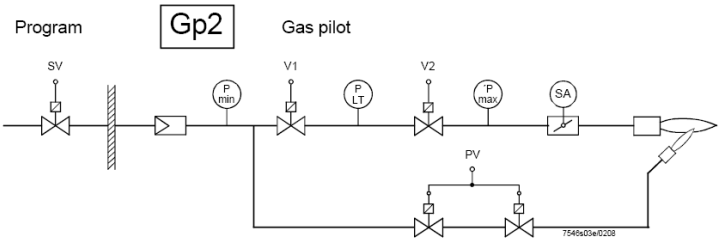
G mod



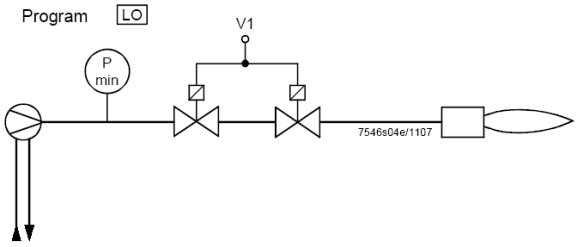
Gp1 mod



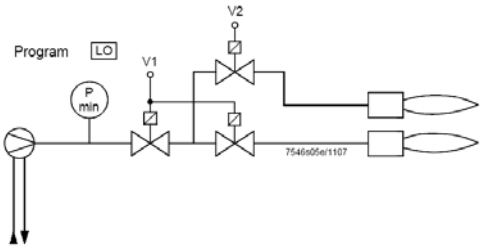
Gp2 mod



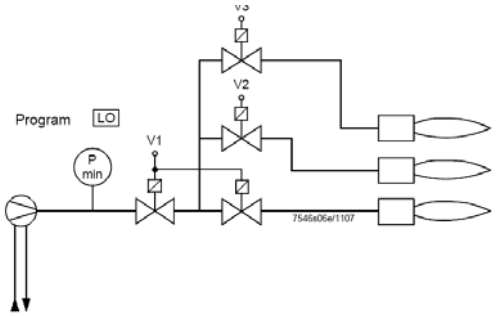
Lo mod



Lo 2-stage

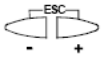


Lo 3-stage



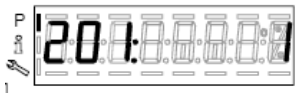
In the example the Gmod gas train has been set (Configuration “1”).

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

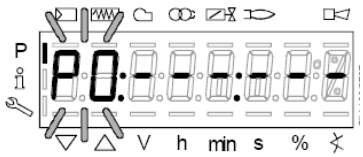


Then press ESC 

to quit. The following display is:



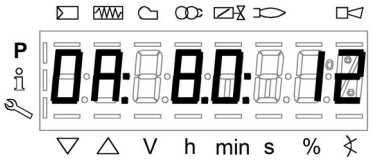
Press “**+**” to show the first point to be set P0.



Press **F** and **“+”** to increase the opening angle of the fuel actuator “**0F”** until the requested value is reached (for example 12°÷15°, see below) for the ignition point; or press **F** and **“-”** to decrease the angle:



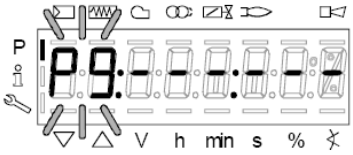
To set the air damper opening angle “0A” in the ignition point (10° for example - see below), press “A” and “+” “A” and “-” at the same time:



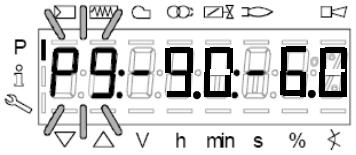
LMV37:

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

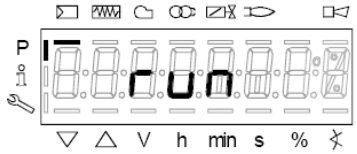


go on as described above to the the opening angles of the air actuator (A) and fuel actuator (F):



⚠	**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 ENTER .

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 perfomed 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 perfomed the calculated point P2 is shown.

5 By pressing "+", it is possible to go through the processed curve until point P9 is reached.

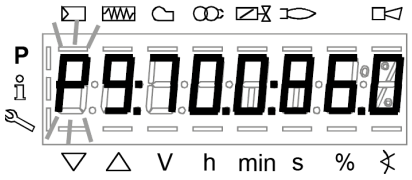
Note: if the point doesn't blink, servomotors are still running.

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:



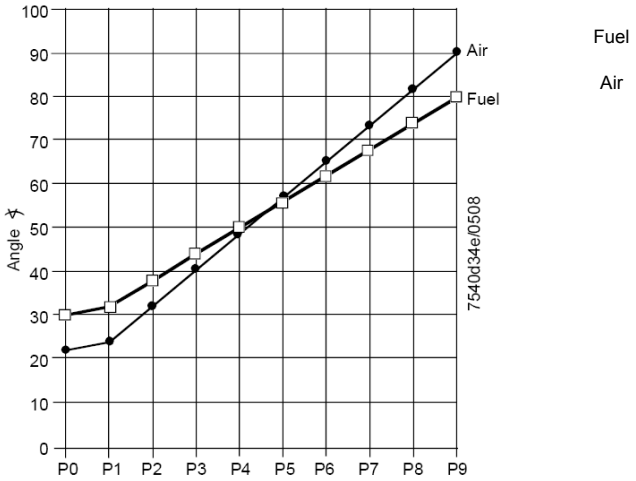
- If, while opening the gas throttle, the gas flow rate was too high, reduce it only through the gas governor and keep opening the throttle until the 60÷70° position is got.
- If the gas train is equipped with a governor and a valve with an adjustable gas flow rate, fully open also this last valve, smoothly! 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:



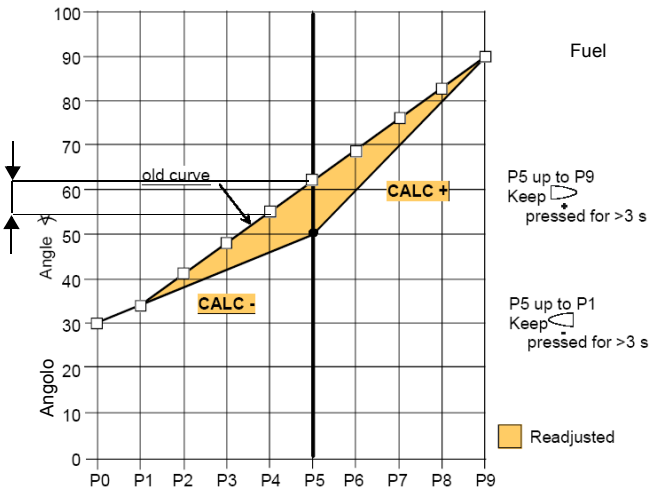
10 the unit will automatically reach point P8 processed: check the combustion values in this point and, if necessary, change it.

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

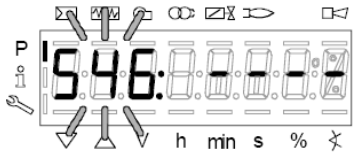
P5, keep pressing “-” unitl “Calc” is displayed. The curve will be processed again downwards point P1.

deviation between two following points: 25°max.

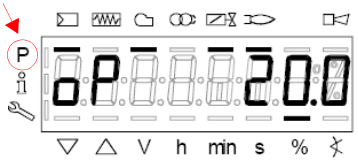


12 press “-” to go through the lower points and check the combustion values, if necessary change the points as described above.

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

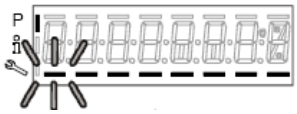
Once the LMV turns on, the AZL display will show



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 acttuator (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 valeus 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





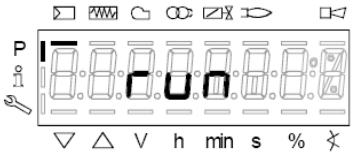
enter the password following the procedure on chapter "Programming LMV2x".

Press ENTER until the display will show:





Press ENTER again: it will show



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

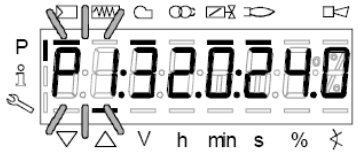
Ph40: *1st safety time* phase (ignition transformer ON)

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):

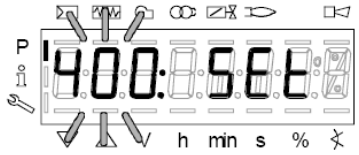


Set the air/fuel ratio curvepoints as described on chapter “Programming the LMV2x”

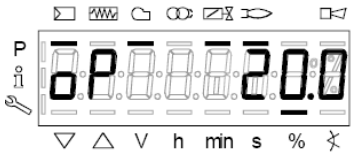
Note: the other phases are
Ph60 = operation (OP= in modulation)
Ph62 = travelling to shutdown
Ph70 = off but in prepurge after the burntime
Ph72 = travelling to postpurging
Ph74 = postpurge (countdown is displayed)

Press ESC  the parameter “**546**” (Setting the maximum load) is displayed

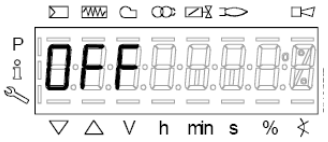
Then press  to exit the programming mode.
The display will show:



Press  for a second time: the display will show the load percentage the burner is working at.



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



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

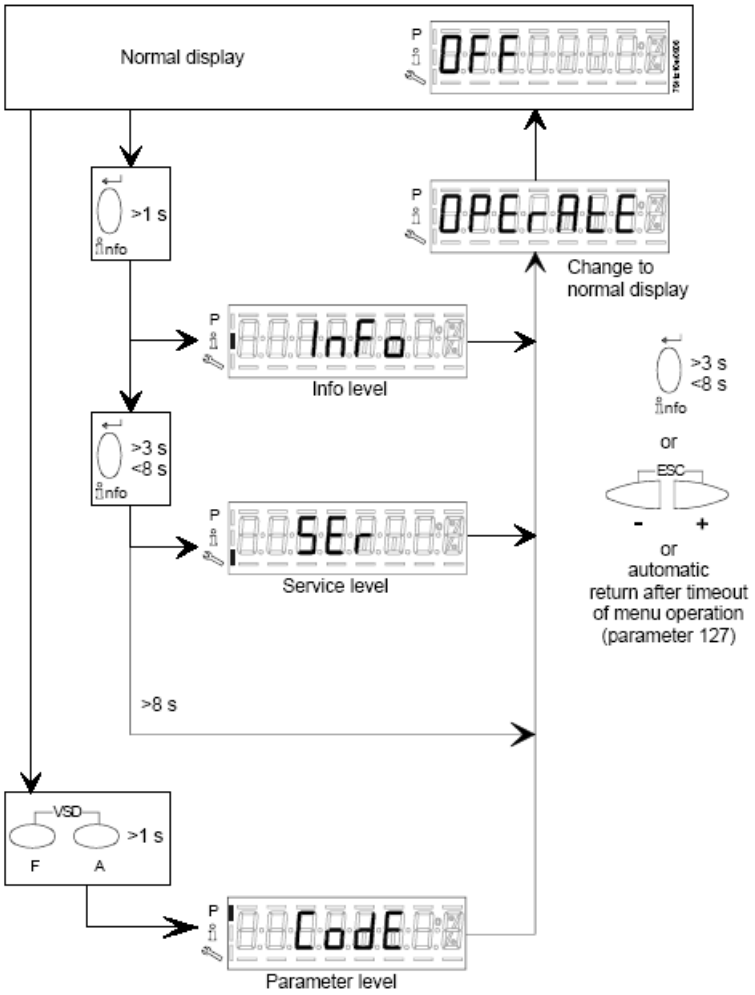
The time for automatically leaving the parameter setting level can be adjusted between 10 and 120 minutes, using the parameter 127 (Timeout for menu operation). If, during that period of time, there is no operation via the AZL2..., the parameter setting level is quit and the password level reset to *Info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

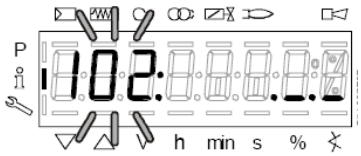


3 then il will show the first code (167) flashing, on the right side it will show the data entered. By pressing **+** or **-** it is possible to scroll (up or down) the parameter list.

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



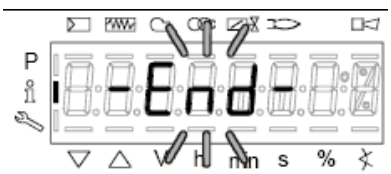
the display shows parameter **102** flashing on the left and characters **._._** on the right.

6 press InFo for 1-3 seconds: the date will appear

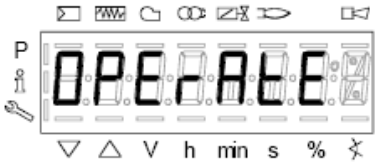
7 press InFo to go back to parameter “102”

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.



10 Press **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



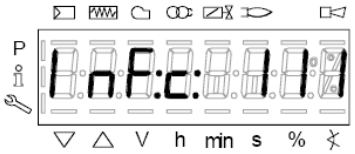
Diagnostic code (in the example “diagnostic code:3”). Record the codes and find out the fault in the Error table

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



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

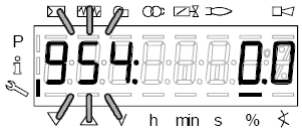
Service level

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



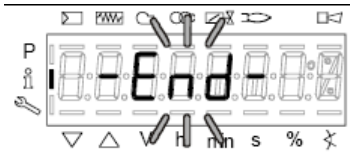
The service level shows all the information about flame intensity, actuators position, number and lock codes:

Parameter	***Description***
954	Flame intensity
121	% output, if set = automatic operation
922	Actuators position, 00=combustibile; 01= aria
161	Lock-outs number
701..725	Lock-outs History (see chapter 23 in the LMV2x manual)

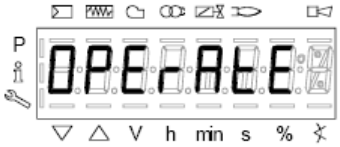


1 the first parameter will be “954”: the percentage of flame is shown on the right. By pressinf + or - it is possible to scroll up/down the parameter list.

2 Once the last parameter is accessed (143) by pressing **+** , the **End** message will blink.



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



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 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, pressure test
Ph90	Tempo attesa “mancanza gas”	Gas shortage waiting time

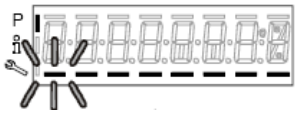
BACKUP PARAMETER WITH AZL2x

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”.

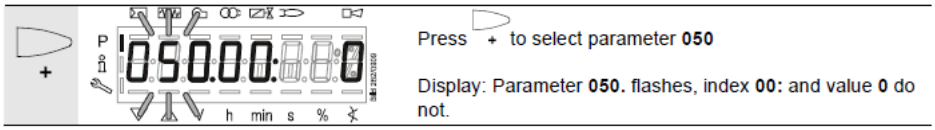
Press ENTER until the display will show:





with the button  go to the group **000** of the parameters and press 

;with the buttons **+** and **-** go to **050** parameter



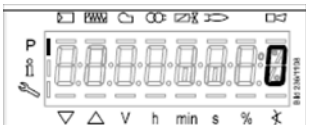
press 

the disply show 

press again 

with the button **+** select **1** and start the backup process by pressing 

.

After about 5 seconds the backup process ends and the display shows 

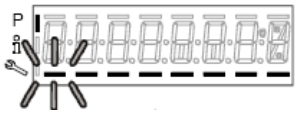
.

⚠	**It is recommended that you perform a backup procedure whenever you change the parameters of the LMV for having a copy in AZL2x!**

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



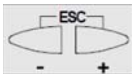


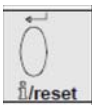
enter the password following the procedure on chapter “Programming LMV2x”.
Press ENTER until the display will show:





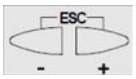
⚠	**To copy the configuration from AZL2x to LMV. It is important that the type of LMV is the same (for example LMV20 with LMV20, etc.) and that 113 "Burner ID" of the burner is the same value that is saved in the configuration you want to copy.**

With the buttons 

go to the group **100** of the parameters, press на 

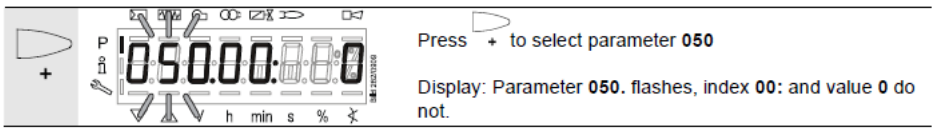
and always with the buttons **+** and **-** go to **113** parameter "Burner ID", press 

and verify (and/or change with buttons by pressing enter to confirm)

iWith the buttons 

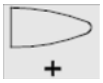
go to the group **000** of the parameters, press 

end select the **050** parameter



press 

the disply show 

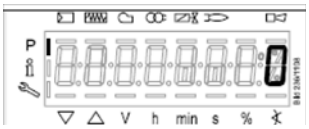
with the button 

the display shows 

press again 

with the button **+** select **1** and start the restore process by pressing 

.

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 prevention*	
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 prevention*	
	18	*Extraneous light during startup, combustion pressure – start prevention*	
	24	*Extraneous light during startup, air pressure, combustion 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, combustion pressure, POC – start prevention*	
7	**#**	**Loss of flame**	
	0	*Loss of flame*	
	3...255	*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 → Value 5 = 1 s)

Error code	Diagnostic code	Meaning for the LMV20... system	Remedy
12	**#**	**Valve proving**	
	0	*Fuel valve 1 (V1) leaking* *(fuel valve 2 with valve proving via X5-01)*	With valve proving via X5-01 (gas pressure switch-min) - Check if valve on the burner side is leaking - Check if pressure switch for valve proving is closed, if gas pressure exist - Check wiring for short-circuit
	1	*Fuel valve 2 (V2) leaking* *(fuel valve 1 with valve proving via X5-01)*	With valve proving via X5-01 (gas pressure switch-min) - Check if valve on the gas side is leaking - Check wiring for short-circuit
	2	*Valve proving not possible*	Valve proving activated, but pressure switch-min selected as input function for X9-04 (check 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)
	81	*V1 leaking*	Check to see if the valve on the gas side is leaking Check wiring to see if there is an open-circuit
	83	*V2 leaking*	Check to see if the valve on the burner side is 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
	1	*POC close*	Check wiring Check to see if the valve's closing contact opens when valve is controlled
	64	*POC open - start prevention*	Check wiring to see if there is a line interruption. 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 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* *POC: POC open (software version ≤ V02.00)*	Check wiring to see if there is a line interruption. POC: Check to see if the valve's closing contact is closed.

Error code	Diagnostic code	Meaning for the LMV2x/3x... system	Remedy
22 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 prevention*	
	5	*Safety loop/burner flange, air pressure – start prevention*	
	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 calculation 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 calculation 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 → 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**	Basic unit could not correct the difference in speed and reached a control range limit. 1. Basic unit is not standardized for this motor → repeat standardization. **Caution!** **Settings of fuel-air ratio control must be checked.** 2. Ramp time settings of the VSD are not shorter than those of the basic unit (parameters 522, 523). 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). 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)
	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 → 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 long)*	Timeout at the end of standardization during ramp down of the VSD → 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 → lock the basic unit, then reset it and repeat the standardization
	3	*Line interruption speed sensor*	Basic unit receives no pulses from the speed sensor: 1. Motor does not turn. 2. Speed sensor is not connected. 3. Speed sensor is not activated by the sensor disk (check distance)
	4	*Speed variation / VSD ramp up time too long / speed below minimum limit for standardization*	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). 2. 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). 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)
	5	*Wrong direction of rotation*	Motor's direction of rotation is wrong. 1. Motor turns indeed in the wrong direction → change parameterization of the direction of rotation or interchange 2 live conductors. 2. Sensor disk is fitted the wrong way → turn the sensor disk.
	6	*Unplausible sensor signals*	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 2. As the motor turns, other metal parts are detected also, in addition to the tappets → improve mounting. 3. Electromagnetic interference on the sensor lines → check cable routing, improve EMC
	7	*Invalid standardized speed*	The standardized speed measured does not lie in the permissible range → motor turns too slowly or too fast
	15	*Speed deviation µC1 + µC2*	The speeds of microcomputer 1 and 2 deviated too much. This can be caused by wrong standardized 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 ≤12 → controller OFF, start standardization again
	21	*Safety loop / burner flange open*	Safety loop or burner flange is open → repeat standardization with safety loop closed
	22	*Air actuator not referenced*	Air actuator has not been referenced or has lost its referencing. 1. Check if the reference position can be approached. 2. Check if actuators have been mixed up. 3. If error only occurs after the start of standardization, the actuator might be overloaded and cannot reach its destination.
	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 → for measures, refer to error code 80
	Bit 1 *Valency 2...3*	*Upper control range limitation of control*	Speed has not been reached because control range limitation has become active → for measures, refer to error code 80
	Bit 2 *Valency 4...7*	*Interruption via disturbance pulses*	Speed has not been reached due to too much electromagnetic interference on the sensor line → for measures, refer to error code 81
	Bit 3 *Valency ≥ 8*	*Curve too steep in terms of ramp speed*	Speed has not been reached because detected curve slope was too steep. 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. 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. With a LMV26... ramp of 5 s, the curve's slope may be a maximum of 40% speed change between 2 curvepoints in modulating mode. → 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. 2. The setting of the VSD ramp must be about 20% faster than the ramps in the basic unit (parameters 522, 523).
	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*	1. 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 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. 2. Setting of the VSD ramp must be about 20% shorter than the ramps in the basic unit (parameters 522 and 523)
	Bit 1 *Valency 2..3*	*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 4..7*	*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 → check to see if actuator is locked or overloaded
	Bit 0 *Valency 1*	*Line interruption*	*Line interruption* detected at actuator's terminals → 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 → 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*	Test the contacts: 1. Unit connected to power: Fan output must be dead. 2. Disconnect power: Disconnect fan. No resistive connection between fan output and neutral conductor allowed. If one of the 2 tests fails, release the unit since contact have definitively welded and safety can no longer be ensured.
97	**#**	**Error relay supervision**	
	0	*Safety relay contacts have welded or external power supply fed to safety relay*	Test the contacts: 1. Unit connected to power: Fan output must be dead. 2. Disconnect power: Disconnect fan. No resistive connection between fan output and neutral conductor allowed. If one of the 2 tests fails, release the unit since contacts have definitively welded and safety can no longer be ensured.

Error code	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 *Alarm in case of start prevention* (parameter number 210 = 0, when using a release contact) or *interrupt* 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 diagnostic 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
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 → Improve EMC
121	**#**	**Internal error EEPROM access**	Make a reset, repeat last parameterization / check. Restore the parameter set, if error occurs repeatedly, replace the unit
122	**#**	**Internal error EEPROM access**	Make a reset, repeat last parameterization / check. Restore the parameter set, if error occurs repeatedly, replace the unit
123	**#**	**Internal error EEPROM access**	Make a reset, repeat last parameterization / check. Restore the parameter set, if error occurs repeatedly, replace the unit
124	**#**	**Internal error EEPROM access**	Make a reset, repeat last parameterization / check. Restore the parameter set, if error occurs repeatedly, 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 repeatedly, 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 synchronization**	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 synchronization**	Make a reset, repeat last parameterization / check. If error occurs repeatedly, replace the unit
134	**#**	**Internal error EEPROM access – Request synchronization**	Make a reset, repeat last parameterization / check. If error occurs repeatedly, replace the unit
135	**#**	**Internal error EEPROM access – Request synchronization**	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)

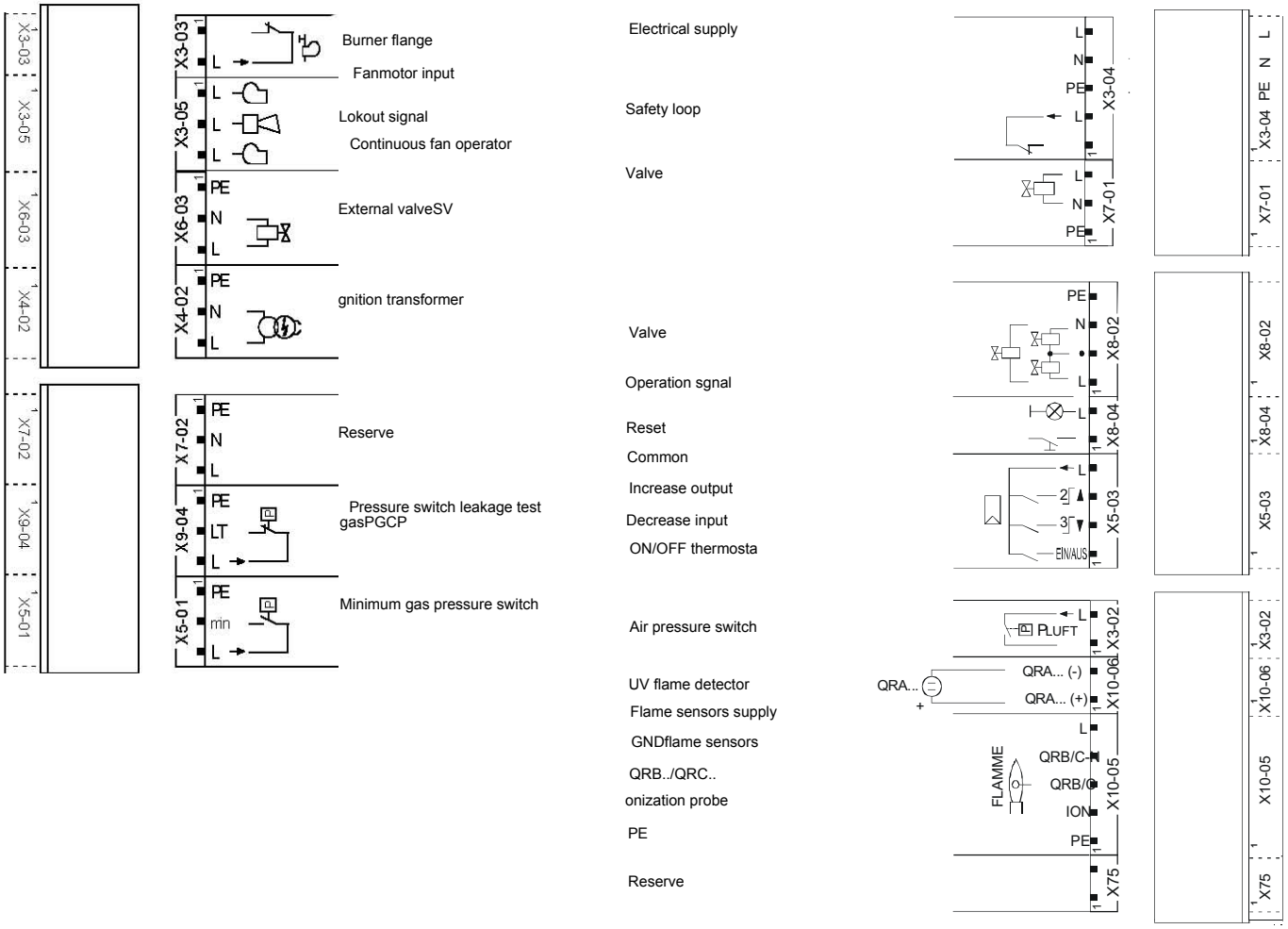
Error code	Diagnostic code	Meaning for the LMV2x/3x... system	Remedy
137	**#**	**Internal error – backup / restore**	
	157 (-99)	*Restore – ok, but backup < data set of current system*	Restore successful, but backup data record is smaller than in the current system
	239 (-17)	*Backup – storage of backup 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 identification*	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 In case of repeated backup timeout, the AZL2... does not yet support backup functionality
146	**#**	**Timeout building automation interface**	Refer to Modbus User Documentation (A7541)
	1	*Modbus timeout*	
	2	*reserved*	

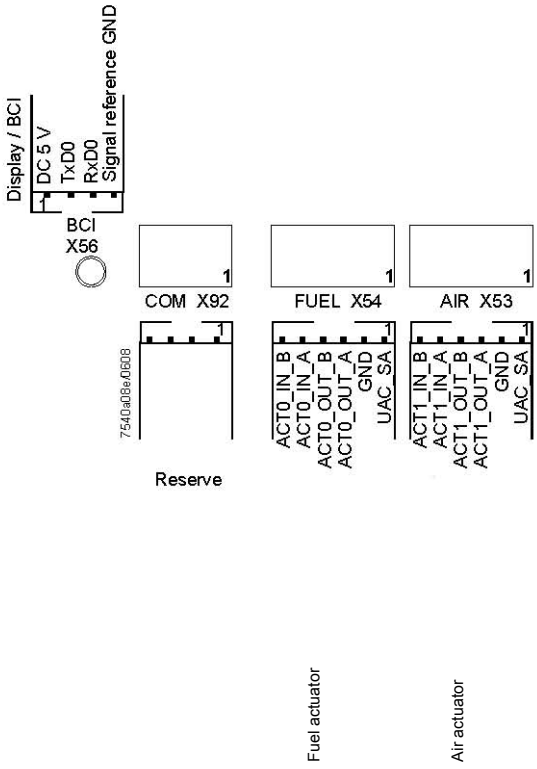
Error code	Diagnostic code	Meaning for the LMV2x/3x... system	Remedy
150	**#**	**TÜV test**	
	1 (-1)	*Invalid phase*	TÜV test may only be started in phase 60 (operation)
	2 (-2)	*TÜV test default output too low*	TÜV test default output must not be smaller than the lower output limit
	3 (-3)	*TÜV test 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*	No loss of flame after shutdown of fuel valves 1. Check to see if there is extraneous light 2. Check wiring to see if there is a short-circuit 3. Check to see if valve is leaking
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 UPr0 or **OFF UPr1**	**#**	**Prevention of startup**	Start prevention due to unparameterized unit Go to error history, entry 702, for initial cause of the error with shutdown in connection with the first curve settings
	Bit 0 *Valency 1*	*No operating mode selected*	
	Bit 1 *Valency 2..3*	*No fuel train defined*	
	Bit 2 *Valency 4..7*	*No curves defined*	
	Bit 3 *Valency 8..15*	*Standardized speed undefined*	
	Bit 4 *Valency 16..31*	*Backup / restore was not possible*	
202	**#**	**Internal error operating mode selection**	Redefine the operating mode (parameter 201)
203	**#**	**Internal error**	Redefine the operating mode (parameter 201). 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 (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
210	*0*	*Selected operating mode is not released for the basic 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





Wiring variants for LMV27

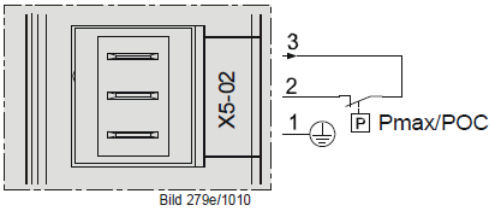
ConnectorX75



2 - Fuel meter input

1 - Supply fuel meter

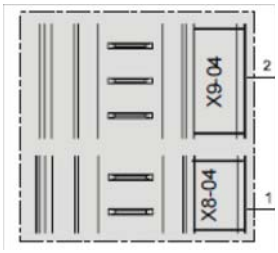
ConnectorX5-02



ConnectionsPmax

Wiring variants for LMV26

ConnectorX08-04 / X09-04



2 - Fuel 0

1 - Fuel1

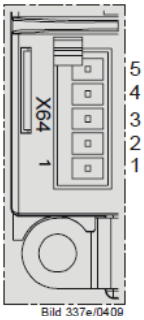
ConnectorX75



2 - Fuel meter input

1 - Supply fuel meter

ConnectorX64



5 -Power supply speed sensor

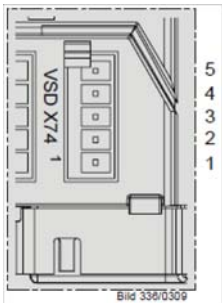
4 -Speed sensor input

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

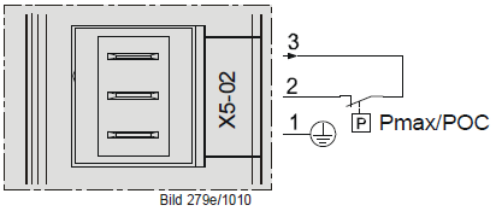
ConnectorX75



2 - Fuel meter input

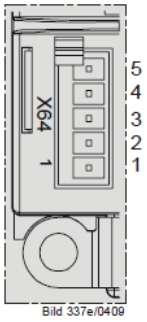
1 - Supply fuel meter

ConnectorX5-02



Connections Pmax

ConnectorX64



5 -Power supply speed sensor

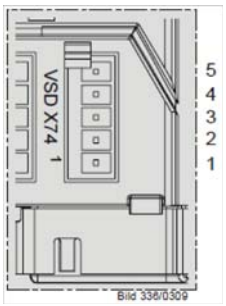
4 -Speed sensor input

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



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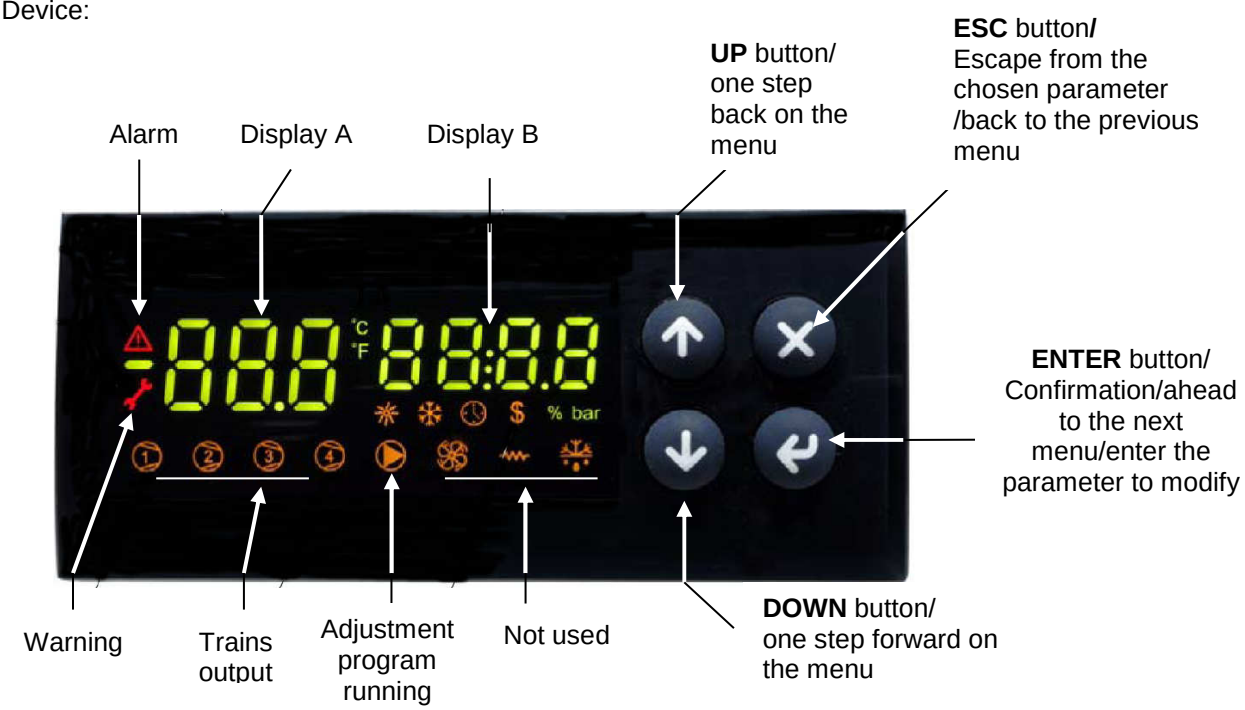
Note: Specifications and and data subject to change. Errors and omissions excepted.

USER MANUAL OF MULTI-THERMOSTAT

MCX06C

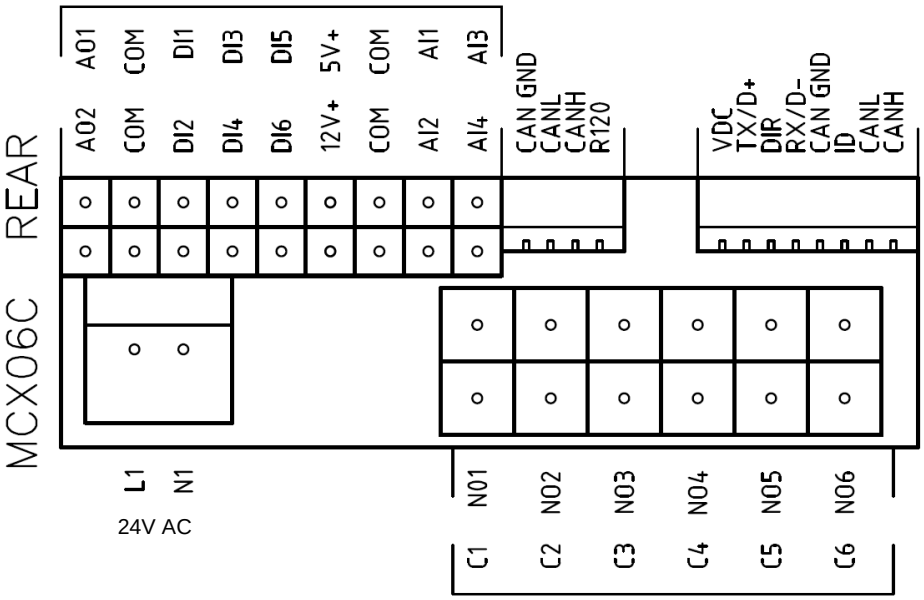
MCX06C is a multi-thermostat with four 100k NTC inputs. It can control up to 4 temperatures showing them (not more than 2 at the same time) on a couple of displays.
It is used to check and adjust oil heater temperatures.

User interface:
Device:



Note :
In normal operation, the display A shows the oil tank resistor temperature (probe Pb1).
In normal operation, the display B shows the oil output temperature (probe Pb3).

Connections from terminal side:



Probe connection:
input **AI1** = probe **Pb1** = set-point "**tr**" = oil heater temperature probe;
input **AI2** = probe **Pb2** = set-point "**tCI**" = plant consent temperature probe (when installed);
input **AI3** = probe **Pb3** = set-point "**OIL**" = oil heater output temperature probe (PID regulation);
input **AI4** = probe **Pb4** = set-point "**tcn**" = oil heater consent temperature probe.

Menu:
To enter the menu below, keep pushing **ENTER** for more than 3 s.

Menu code	Sub-menu code	Function	Notes
Prb		Probes values	You can see in sequence the 4 probe values (UP and DOWN keys): the probe code is on display A (Pb1,..., Pb4) and the probe value is on display B (not fitted or out of work probes show "----").
Log		Login	It defines the access level to menu and parameters (password)
	PAS	Password	Password input
Par		Parameters menu	Access to parameters (you have to login first)
	CnF	Configuration menu	Parameter configuration
	rEG	Regulation menu	Set to set-point, probe, thresholds etc.
ALA		Alarm menu	Access to alarm management
	Act	Active alarms	Show the active alarms
	rES	Reset alarms & Warning	Reset of the manual reset alarms and warning
Loc		Lock/Unlock functions	Not used
InF	rEL	Software version	Installed software version
tUN		Autotuning	Activation On, deactivation ESC PID parameter autotuning

Alarms & Warning:
When the red triangle on the top left lights, one or more alarms are activated.
When the red key on the left lights, the output N05-C5 is active and the relay **KTRS** switches the resistors OFF.
Check the reason, correct the failure and, as soon as the temperature is lower than **trS**, reset it through **ALA**/**rES .**
In order to show active alarms and warnings, select the relevant menu through **ALA**/**Act**.and, using the **UP** and **DOWN** buttons, scroll the lines.
In order to perform the manual reset, select **ALA**/**rES**.

Code	Description	Sourse	Active simbol	Reset type
trS	High temperature resistors alarm	probe Pb4 > value trS	red key	Manual
EP1	Probe Pb1 fault	Probe Pb1 fault	red triangle	Automatic
EP2	Probe Pb2 fault	Probe Pb2 fault	red triangle	Automatic
EP3	Probe Pb3 fault	Probe Pb3 fault	red triangle	Automatic
EP4	Probe Pb4 fault	Probe Pb4 fault	red triangle	Automatic

Set point adjustment:
All the parameters inside the **Par** menu are locked by a password.
The user can modify only set points (menu **rEG**), without using any passwords.
The oil viscosity at the nozzle, should be about 1,5°E, which guarantees correct and safe functioning of the burner.
The temperature values in the table, guarantee the respect of that parameter and are valid when the pre heating tank is installed on the burner. For different configurations , please refer to the chapter "Recommendations to design heavy oil feeding plants" in the burner manual.
Here below recommended set points:

Menu path				Oil viscosity at 50 °C according to the letter show n in the burner model				
				P	**N**	**E**	**D**	**H**
				89 cSt	< 50 cSt	> 50 cSt < 110 cSt	> 110 cSt < 400 cSt	> 400 cSt < 4000 cSt
				12 °E	< 7°E	> 7 °E < 15 °E	> 15 °E < 50 °E	> 50 °E < 530 °E
Par								
rEG	Pb1	tr	Oil heater temperature probe	parameter not visible				
	Pb2	tCI	Plant consent temperature probe (when installed)	20 °C	70 °C	70 °C	70 °C	---
	Pb3	Oil	oil heater output temperature probe (PID regulation);	60-70 °C	110-120 °C	120-130 °C	130-140 °C	140-150 ° C
		SP0	Set-point oil heater with oil pump stopped (stand-by)	45 °C	120 °C	130 °C	140 °C	150 °C
	Pb4	tcn	Oil heater consent temperature probe	40 °C	100 °C	100 °C	110 °C	120 °C
		trS	Safety temperature tank resistors (manual reset)	120 °C	190-200 °C	190-200 °C	190-200 °C	190-200 °C

The above temperature values are suggested and refer to a plant designed according to the prescriptions in the burner user manual. The suggested values can change in reference to the fuel oil specifications.