KPBY91
KPBY92
KPBY93
KRBY512
KRBY515
KRBY520
KRBY525

LMV5x

Microprocessor-controlled
Progressive
and fully-modulating gas - heavy oil burners

MANUAL OF INSTALLATION - USE - MAINTENANCE

CIB UNIGAS

BURNERS - BRUCIATORI - BRULERS - BRENNER - QUEMADORES - ГОРЕЛКИ

M039711CA 0.0 10/2023

DANGERS, WARNINGS AND NOTES OF CAUTION

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

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

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

Carefully keep this manual for future reference.

The following:

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

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

IMPORTANT :

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

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

RISK ANALYSIS

Instruction manual supplied with the burner:

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

Delivery of the system and instruction manual

.

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

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

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

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

WARRANTY AND LIABILITY

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

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

Furthermore, the manufacturer declines all responsibility for 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

BURNERS FEATURES

Burner model identification

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

Type	**KPBY93**	Model	**MH.**	**MD.**	**S.**	**.**	**A.**	**1.**	**50.**	**ES.**
	(1)		**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**

(1) BURNER TYPE	**KPBY91 - KPBY92 - KPBY93 - KRBY512 - KRBY515 - KRBY520 - KRBY525**
(2) FUEL	M - Natural gas H = heavy oil, viscosity <= 4000cSt (530°E) a 50°C
(3) OPERATION (Available versions)	MD - Fully modulating
(4) BLAST TUBE	S - Standard L - Extended
(5) DESTINATION COUNTRY	* - see data plate
(6) BURNER VERSION	A - Standard Y - Special
(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

			with O_2	**Inverter**	**FGR**
9	MICRO-PROCESSOR CONTROL	ES	-	-	-
		EO	X	-	-
		EI	-	X	-

Technical Specifications

BURNER TYPE		**KPBY91**	**KPBY92**	**KPBY93**
Output	min - max kW	480 - 2670	480 - 3050	550 - 4100
Fuel		Natural gas / Heavy oil		
Gas category		(see next paragraph)		
Gas rate	min.- max. (Stm^3/h)	51 - 283	51 - 323	58 - 434
Gas pressure	mbar	(see Note 2)		
Oil viscosity		See “Burner model identification” table		
Heavy oil rate	min - max kg/h	42 - 233	43 - 272	49 - 365
Compressed air pressure	min - max bar	4 - 10		
Power supply		230V 3~ / 400V 3N~ 50Hz		
Total power consumption (with Cucchi Pump)	kW	13.25	18.75	26.75
Total power consumption (with Kral Pump)	kW	12.87	18.55	26.55
Fan motor	kW	4	5.5	7.5
Pump motor (Cucchi)	kW	0.75	0.75	0.75
Pump motor (Kral)	kW	0.37	0.55	0.55
Pre-heater resistors	kW	8	12	18
Protection		IP40		
Operation		MD - Fully modulating		
Gas train 50	ØValves / Connection	2” / Rp 2		
Gas train 65	ØValves / Connection	2”1/2 / DN65		
Gas train 80	ØValves / Connection	3” / DN80		
Gas train 100	ØValves / Connection	4” / DN100		
Operating temperature	°C	-10 ÷ +50		
Storage Temperature	°C	-20 ÷ +60		
Working service*		Intermitent		

BURNER TYPE		KRBY512	KRBY515	KRBY520	KRBY525
Output	min - max kW	600 - 4500	770 - 5200	1000 - 6400	2000 - 8000
Fuel		Natural gas / Heavy oil			
Gas category		(see next paragraph)			
Gas rate	min.- max. (Stm^3/h)	63 - 476	81 - 550	106 - 677	212 - 847
Gas pressure	mbar	(see Note 2)			
Oil viscosity		See “Burner model identification” table			
Heavy oil rate	min - max kg/h	53 - 401	69 - 463	89 - 570	178 – 713
Compressed air pressure	min - max bar	4 - 10			
Power supply		230V 3~ / 400V 3N~ 50Hz			400V 3N~ 50Hz
Total power consumption (with Cucchi Pump)	kW	28.45	30.25	40.25	43.75
Total power consumption (with Kral Pump)	kW	28.25	30.05	40.05	43.55
Fan motor	kW	9.2	11	15	18.5
Pump motor (Cucchi)	kW	0.75	0.75	0.75	0.75
Pump motor (Kral)	kW	0.55	0.55	0.55	0.55
Pre-heater resistors	kW	18	18	24	24
Protection		IP40			
Operation		MD - Fully modulating			
Gas train 50	ØValves / Connec-	2” / Rp 2			
Gas train 65	ØValves / Connec-	2”1/2 / DN65			
Gas train 80	ØValves / Connec-	3” / DN80			
Gas train 100	ØValves / Connec-	4” / DN100			
Operating temperature	°C	-10 ÷ +50			
Storage Temperature	°C	-20 ÷ +60			
Working service (*)		Intermitent			

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

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

WARNING: the burners are supplied for 400V three phase supply; in case of three phase 230V supply, replace the thermal overload relays. Maximum output is referred to a null backpressure in the furnace.

Note 1:	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); for L.P.G. (net calorific value H_i = 93,5 MJ / Stm^3).	
Note 2:	Maximum gas pressure	360 mbar (with Dungs MBDLE).
		500 mbar (with Siemens VGD or Dungs MultiBloc MBE).
	Minimum gas pressure	see gas curves
Note 3:	Burners are suitable only for indoor operation with a maximum relative humidity of 80 %.	
Note 4:	With electrode: for safety reasons the burner must stop automatically every 24 hours.	
Note 5:	The type of service can be continuous (flame signal presence for more than 24 h without any stop) or intermittent (at least once every 24 h there is a work stoppage and the flame is extinguished) depending on the configuration ordered. Operation can be continuous in the presence of flame detection via ION ionisation or Siemens QRI..., QRA5..., QRA7... or Lamtec FSS... with Siemens LMV37x or LMV5x flame control equipment (BMS) and Lamtec BT3...	

Gas categories and countries of application

Countries					
AL, AT, BE, BG, CH, CY, CZ, 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					
Models: **“...M-...”, “...MG...”, “...MN...”, “...ME...”, “...MD...”**			***Models:*** **“...L-...”, “...LG...”, “...LN...”**		
Group			Group		
E	LL	Er	B/P	B	P
H	L	E (R)	3R		
EK	2R				

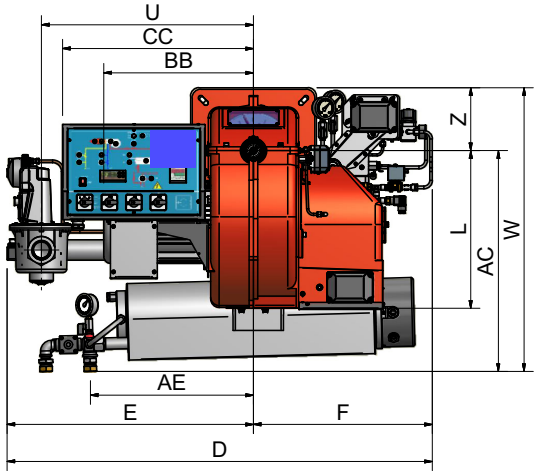
The above gas groups can be combined according to the standard EN437:2021 and national situation of countries.

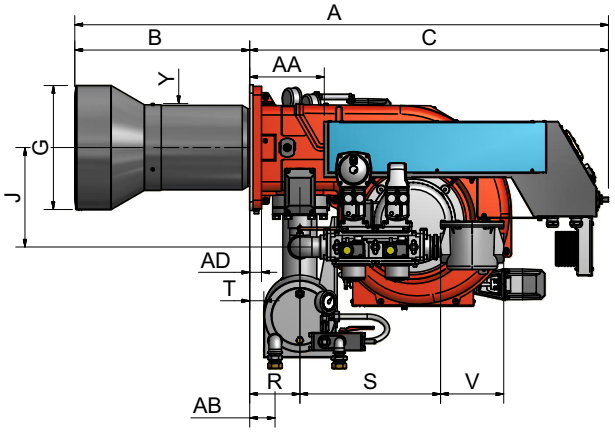
Type of fuel used

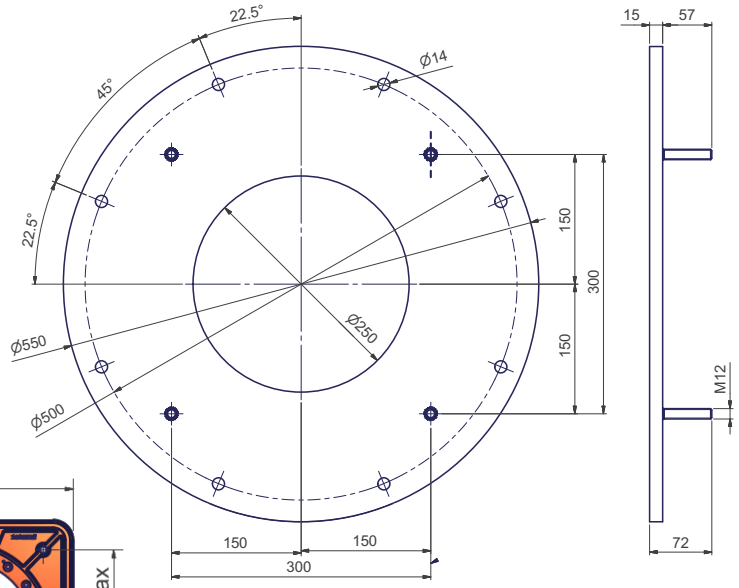
DANGER! The burner must be used only with the fuel specified in the burner data plate.

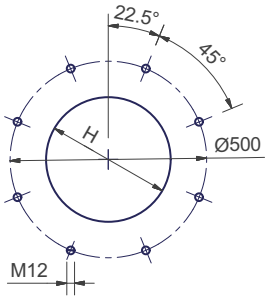
Type	--
Model	--
Year	--
S.Number	--
Output	--
Oil Flow	--
Fuel	--
Category	--
Gas Pressure	--
Viscosity	--
El.Supply	--
El.Consump.	--

Overall dimensions (mm) KRBY9xx

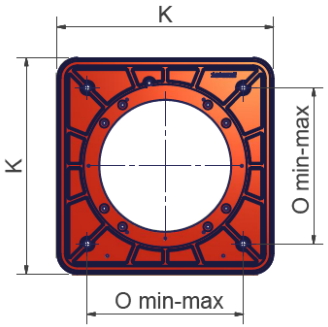








Boiler recommended drilling template



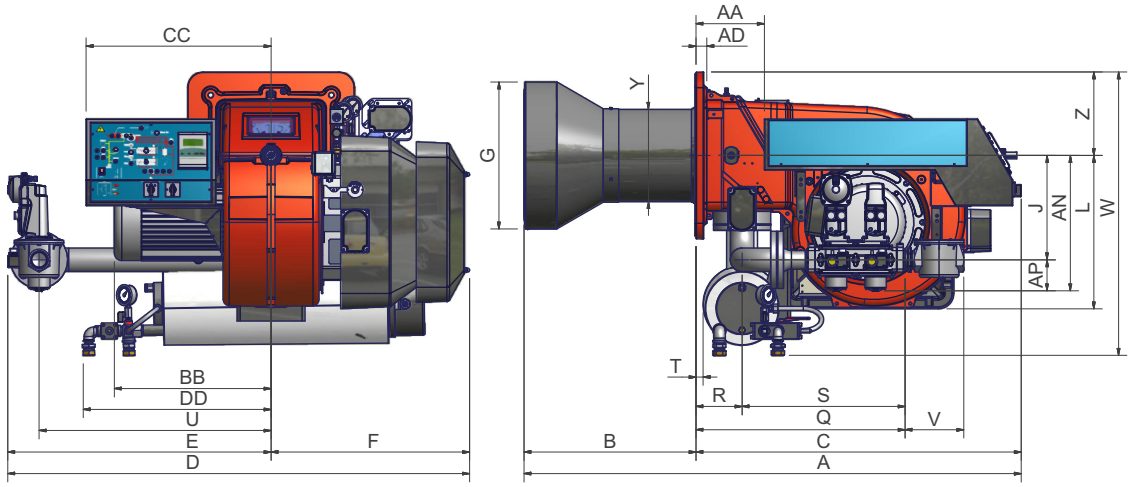
Reccomended counterflange

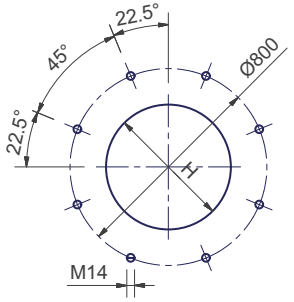
Burner flange

A COUNTERFLANGE IS MANDATORY:a gasket must be placed between the generator and the counterflange

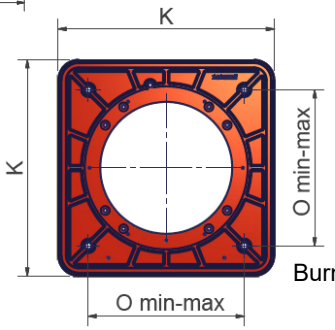
	DN	A	AA	AD	AN	AP	B	BB	C	CC	D	E	F	G	H	J	L	M	Q	R	S	T	U	V	W	Y	Z
KPBY91	50	1617	234	35	392	100	552	441	1065	562	1188	726	462	365	405	292	466	M12	522	148	374	44	624	216	775	239	185
	65	1617	234	35	368	117	552	441	1065	562	1337	875	462	365	405	251	466	M12	632	148	484	44	750	292	775	239	185
	80	1617	234	35	402	132	552	441	1065	562	1339	877	462	365	405	270	466	M12	683	148	535	44	750	313	775	239	185
	100	1617	234	35	555	145	552	441	1065	562	1429	967	462	365	405	410	466	M12	790	148	642	44	824	353	775	239	185
KPBY92	50	1617	234	35	392	100	552	441	1065	562	1188	726	462	365	405	292	466	M12	522	148	374	44	624	216	775	239	185
	65	1617	234	35	368	117	552	441	1065	562	1337	875	462	365	405	251	466	M12	632	148	484	44	750	292	775	239	185
	80	1617	234	35	402	132	552	441	1065	562	1339	877	462	365	405	270	466	M12	683	148	535	44	750	313	775	239	185
	100	1617	234	35	555	145	552	441	1065	562	1429	967	462	365	405	410	466	M12	790	148	642	44	824	353	775	239	185
KPBY93	50	1571	220	35	392	100	514	441	1056	562	1253	726	527	365	405	292	466	M12	522	148	374	44	624	216	775	258	185
	65	1571	220	35	368	117	514	441	1056	562	1402	875	527	365	405	251	466	M12	632	148	484	44	750	292	775	258	185
	80	1571	220	35	402	132	514	441	1056	562	1404	877	527	365	405	270	466	M12	683	148	535	44	750	313	775	258	185
	100	1571	220	35	555	145	514	441	1056	562	1474	967	527	365	405	410	466	M12	790	148	642	44	824	353	775	258	185

*Overall dimensions (mm)*KRBY5xx

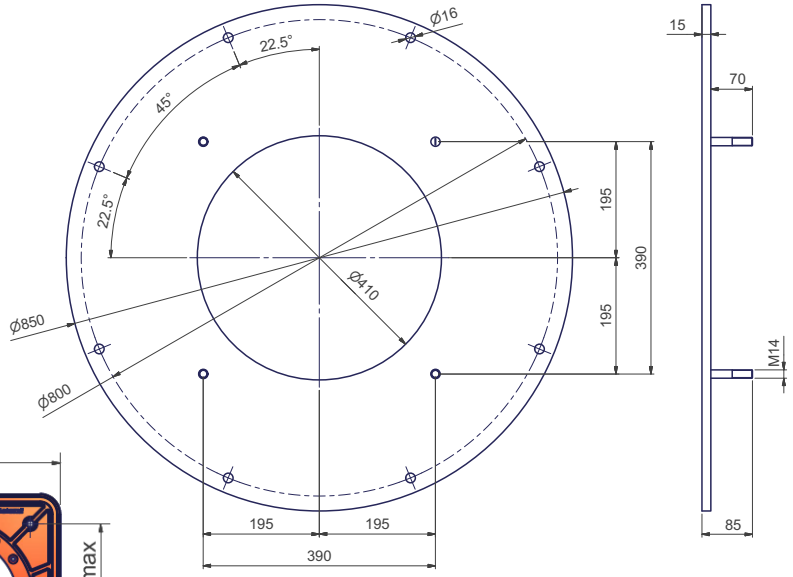




Boiler recommended drilling template



Burner flange

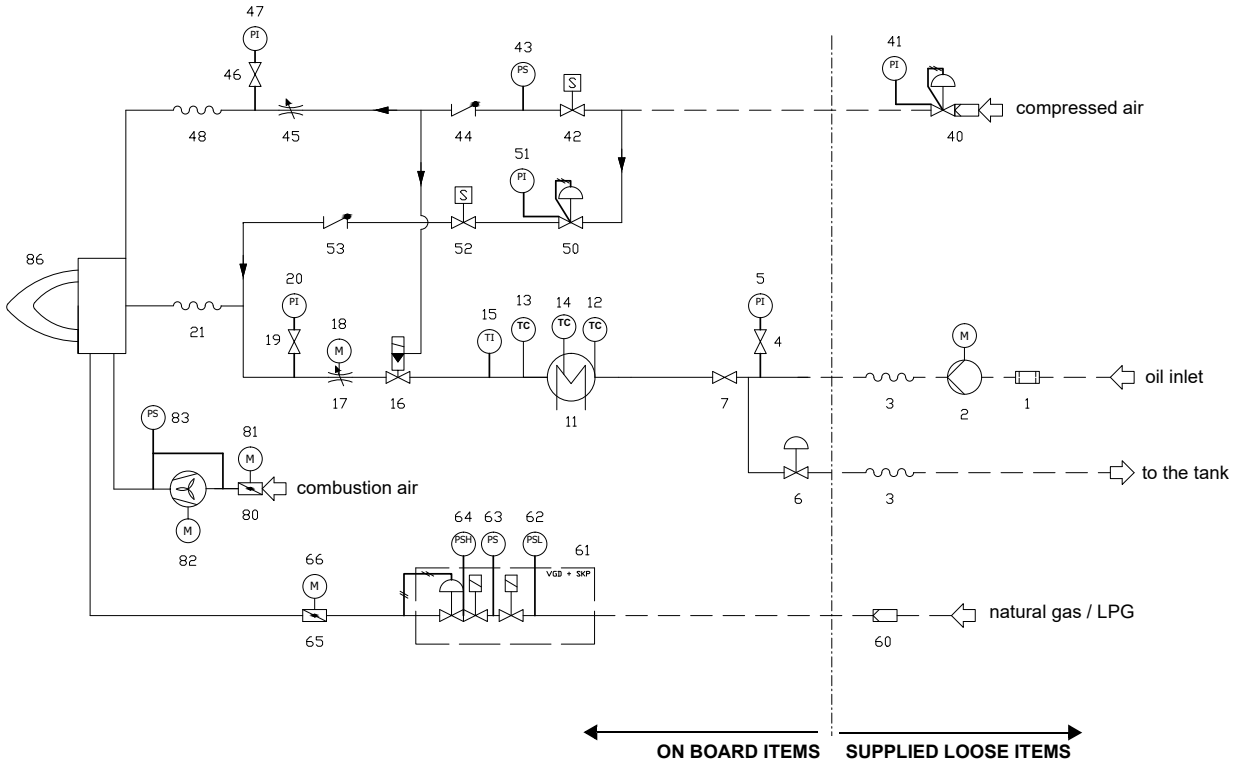


Reccomended counterflange

A COUNTERFLANGE IS MANDATORY:a gasket must be placed between the generator and the counterflange

	DN	A	AA	AD	AN	AP	B	BB	C	CC	D	DD	E	F	G	H	J	K	L	M	O	Q	R	S	T	U	V	W	Y	Z
KRBY512	50	1592	221	35	438	100	593	508	1052	598	1494	589	852	642	500	550	337	540	498	M14	390	675	150	525	38	750	216	917	319	270
	65	1592	221	35	438	118	593	508	1052	598	1494	589	852	642	500	550	337	540	498	M14	390	553	150	403	38	750	292	917	319	270
	80	1592	221	35	466	132	593	508	1052	598	1627	589	985	642	500	550	334	540	498	M14	390	594	150	444	38	857	322	917	319	270
	100	1592	221	35	517	145	593	508	1052	598	1627	589	985	642	500	550	334	540	498	M14	390	674	150	524	38	857	382	917	319	270
KRBY515	50	1608	221	35	438	100	558	508	1052	598	1494	589	852	642	500	550	337	540	498	M14	390	675	150	525	38	750	216	917	319	270
	65	1608	221	35	438	118	558	508	1052	598	1494	589	852	642	500	550	337	540	498	M14	390	553	150	403	38	750	292	917	319	270
	80	1608	221	35	466	132	558	508	1052	598	1627	589	985	642	500	550	334	540	498	M14	390	594	150	444	38	857	322	917	319	270
	100	1608	221	35	517	145	558	508	1052	598	1627	589	985	642	500	550	334	540	498	M14	390	674	150	524	38	857	382	917	319	270
KRBY520	50	1635	221	35	438	100	533	508	1052	598	1494	589	852	642	527	577	337	540	498	M14	390	675	150	525	38	750	216	917	335	270
	65	1635	221	35	438	118	533	508	1052	598	1494	589	852	642	527	577	337	540	498	M14	390	553	150	403	38	750	292	917	335	270
	80	1905	221	35	466	132	533	508	1052	598	1627	589	985	642	527	577	334	540	498	M14	390	594	150	444	38	857	322	917	335	270
	100	1635	221	35	517	145	533	508	1052	598	1627	589	985	642	527	577	334	540	498	M14	390	674	150	524	38	857	382	917	335	270
KRBY525	50	1604	221	35	438	100	552	650	1052	598	1494	589	852	642	572	632	337	540	498	M14	390	675	150	525	38	750	216	917	329	270
	65	1604	221	35	438	118	552	650	1052	598	1494	589	852	642	572	632	337	540	498	M14	390	553	150	403	38	750	292	917	329	270
	80	1604	221	35	466	132	552	650	1052	598	1627	589	985	642	572	632	334	540	498	M14	390	594	150	444	38	857	322	917	329	270
	100	1604	221	35	517	145	552	650	1052	598	1627	589	985	642	572	632	334	540	498	M14	390	674	150	524	38	857	382	917	329	270

Fig. 1 - (3I2MD-02 v1) **Hydraulic diagram**



POS	LEGEND
	OIL TRAIN
1	Filter
2	Pump with electromotor
3	Flexible hose
4	Maual valve
5	Pressure gauge
6	Pressure governor
7	Maual valve
11	Electrical preheater tank
12	Temperature probe
13	Temperature probe
14	Temperature probe
16	Pneumatic valve
17	Metering valve with servomotor
18	Actuator
19	Maual valve
20	Pressure gauge
21	Flexible hose
	COMPRESSED AIR TRAIN (ATOMIZATION)
40	Pressure governor with filter
41	Pressure gauge
42	Solenoid valve
43	Pressure switch
44	One-way valve
45	Metering valve
46	Manual valve
47	Pressure gauge
48	Flexible hose
	COMPRESSED AIR TRAIN (PURGE)
50	Pressure governor with filter
51	Pressure gauge
52	Solenoid valve
53	One-way valve
	COMBUSTION AIR TRAIN
80	Air damper
81	Actuator
82	Remote draught fan with electromotor
83	Pressure switch - PA
86	Burner

The following items are out of CIB UNIGAS scope of supply: 77 - 78 - 79

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).

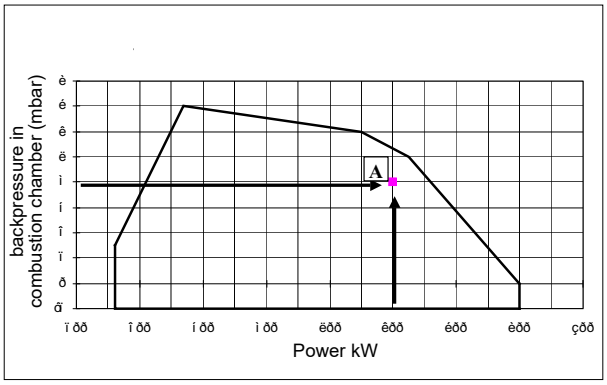
Example:

Furnace input: 600kW

Backpressure: 4mbar

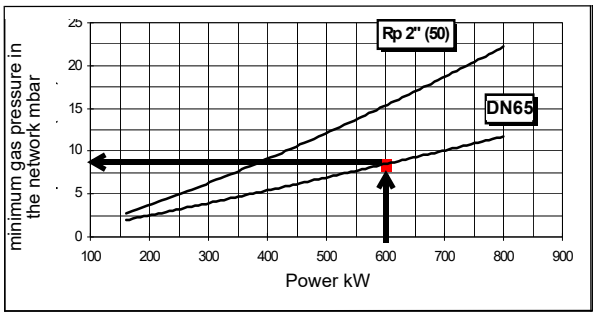
In the "Performance curve" diagram, draw a vertical line matching the furnace input value and an horizontal line matching the backpressure value. The burner is suitable if the intersection point A is inside the performance curve.

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



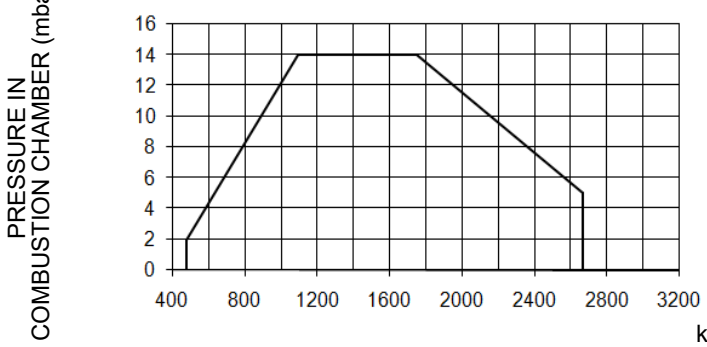
Checking the proper gas train size

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

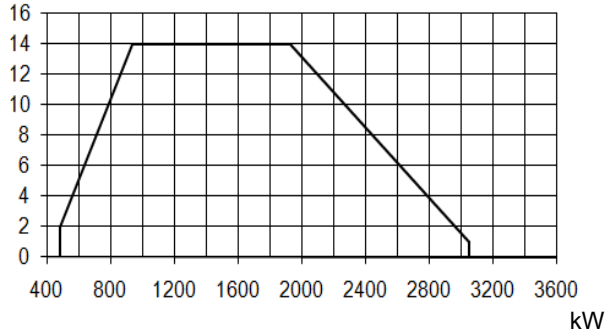


Performance Curves

KPBY91



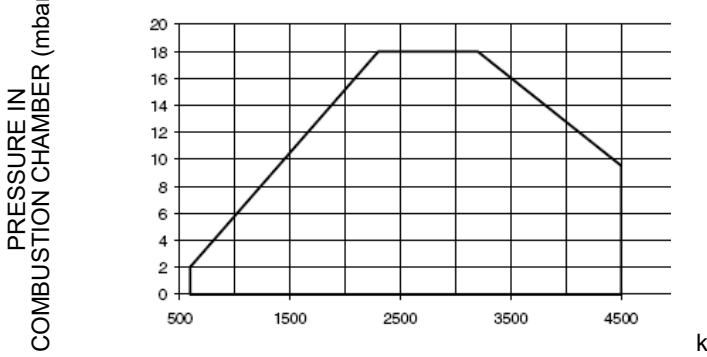
KPBY92



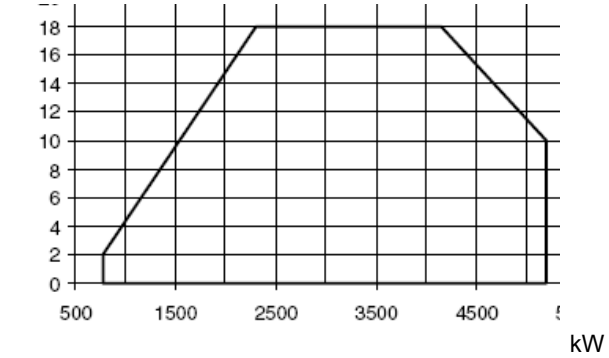
KRBY93



KRBY512



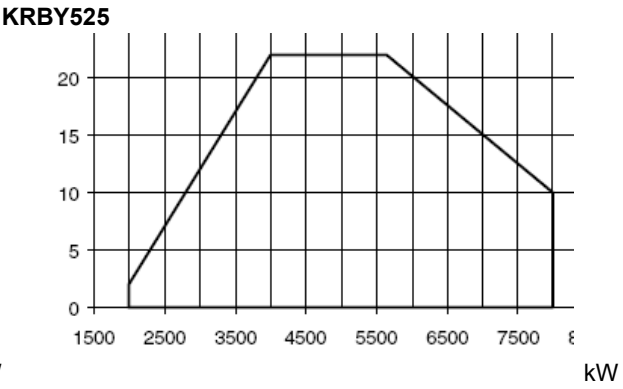
KRBY515



KRBY520



KRBY525



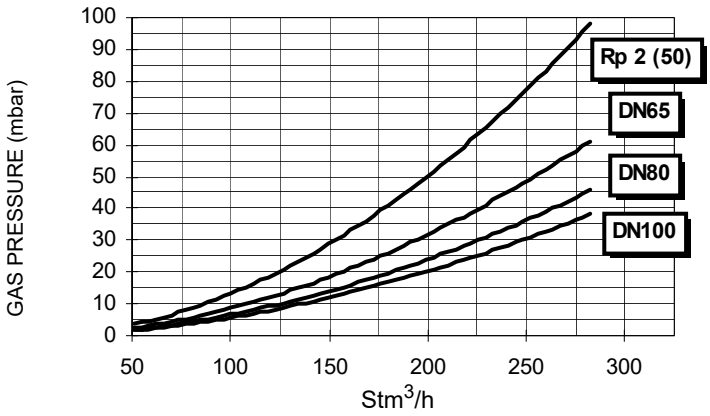
To get the input in kcal/h, multiply value in kW by 860.

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

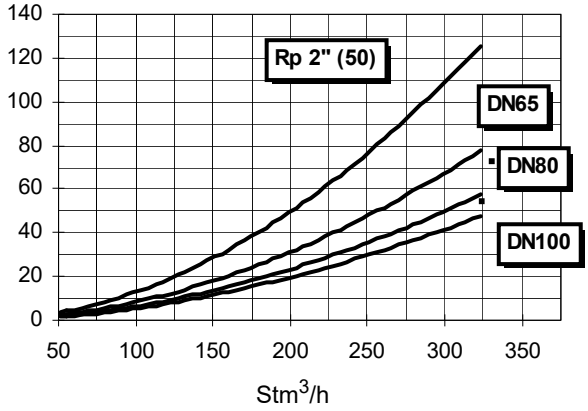
NOTE: The performance curve is a diagram that represents the burner performance in the type approval phase or in the laboratory tests, but does not represent the regulation range of the machine. On this diagram the maximum output point is usually reached by adjsuting the combustion head to its “MAX” 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 flow rate curves

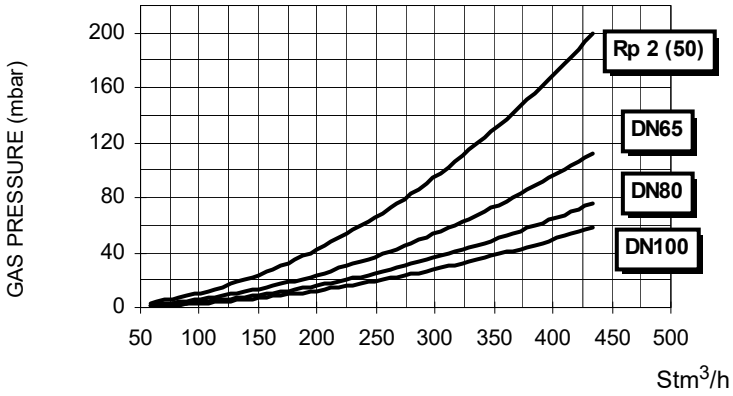
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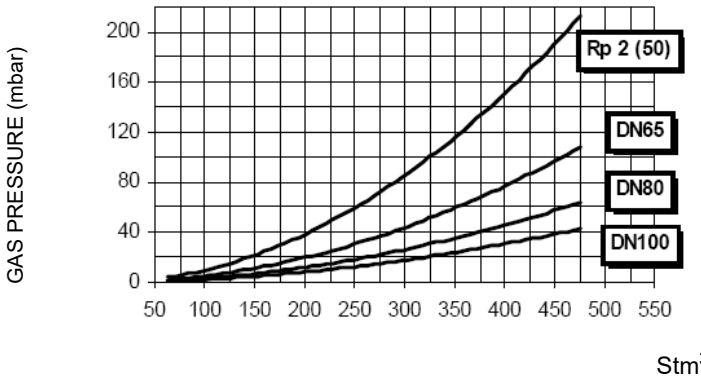
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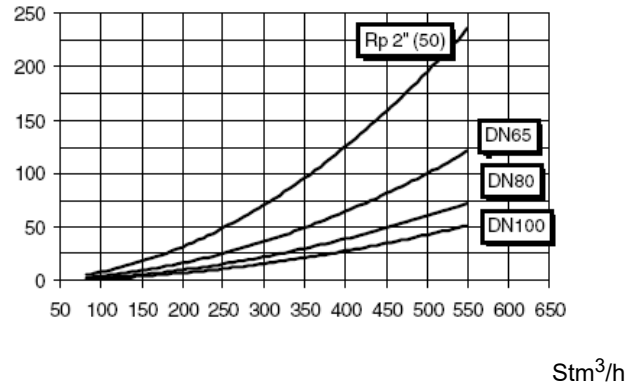
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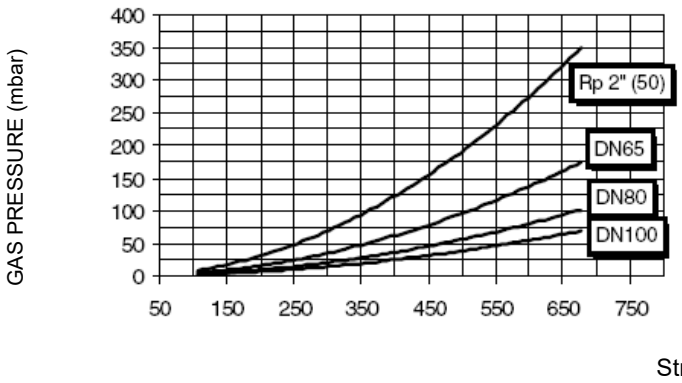
KRBY512



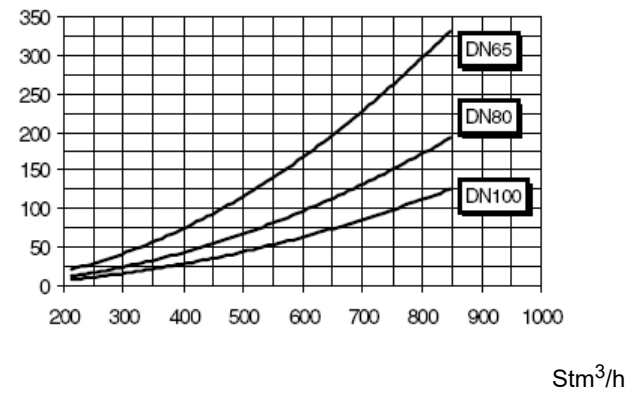
KRBY515



KRBY520



KPBY525



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

Combustion head gas pressure curves depending on the flow rate

The curves referred to the gas pressure in the combustion head, depending on the gas flow rate, are referred to the burner properly adjusted (percentage of residual O_2 in the flues as shown in the "Recommended combustion values" table and CO in the standard limits). During this stage, the combustion head, the gas butterfly valve and the actuator are at the maximum opening. Refer to Fig. 2, 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.

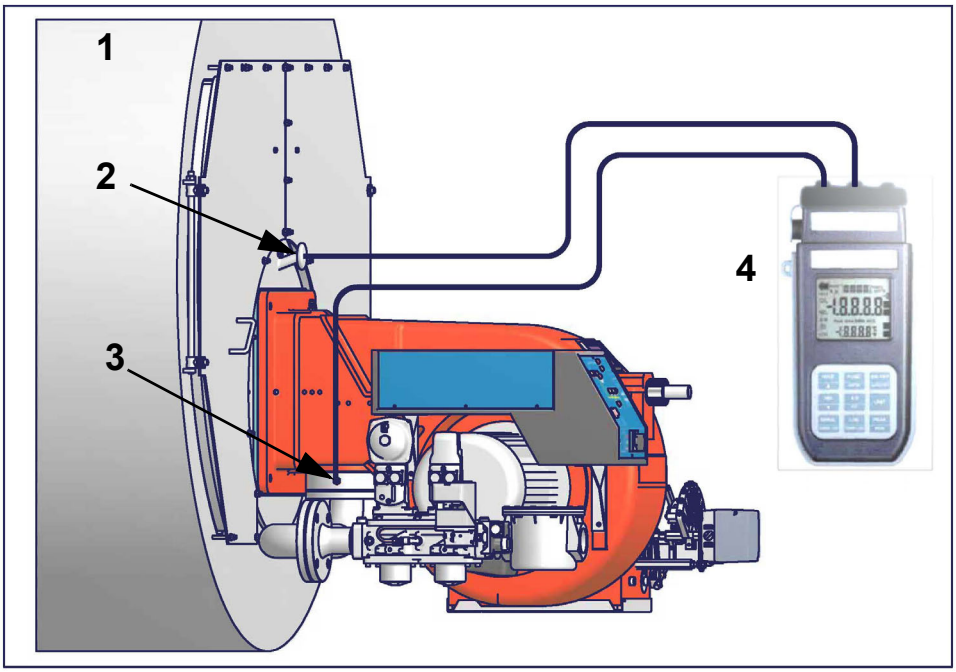


Fig. 2

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

Measuring the gas pressure in the combustion head

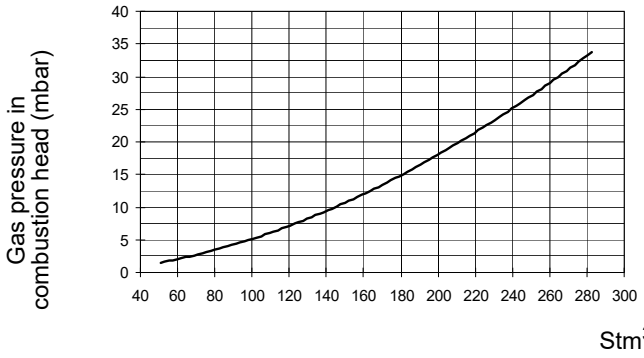
In order to measure the pressure in the combustion head, insert the pressure gauge probes: one into the combustion chamber's pressure outlet to get the pressure in the combustion chamber and the other one into the butterfly valve's pressure outlet of the burner. On the basis of the measured differential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

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.

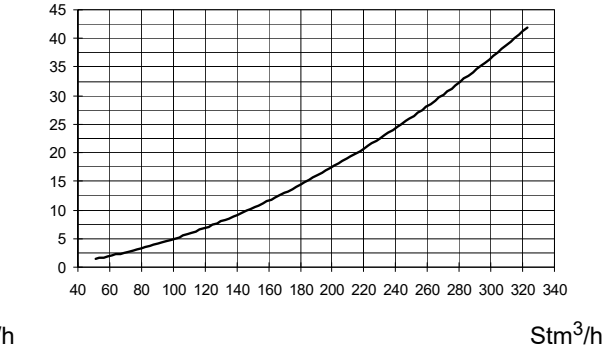
Pressure - rate in combustion head curves

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

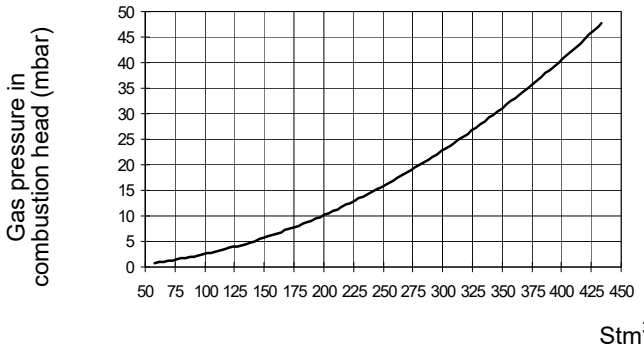
KPBY91



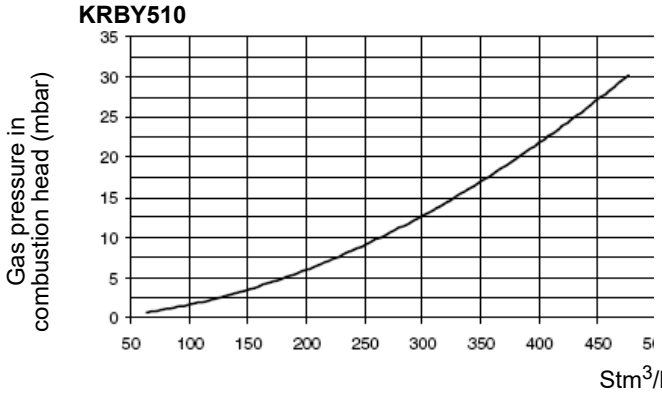
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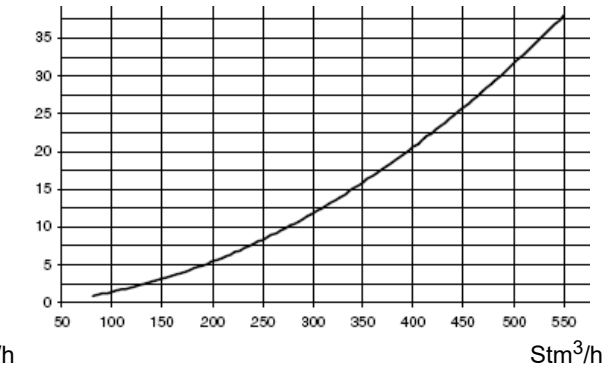
KPBY93



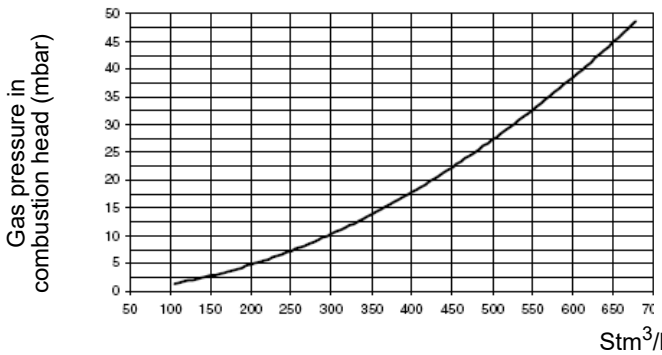
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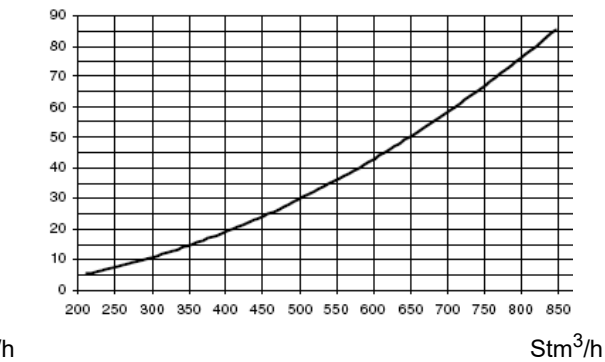
KRBY515



KRBY520



KRBY525



PART II: INSTALLATION

MOUNTING AND CONNECTING THE BURNER

Packing

The burners are despatched in wooden crates whose dimensions are:

1746mm x 1440mm x 1400mm (L x P x H)

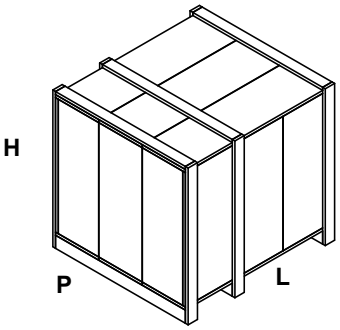


Fig. 1

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

The following are placed in each packing case:

- burner with gas train detached;
- second combustion head;
- flexible hoses
- envelope containing this manual.

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

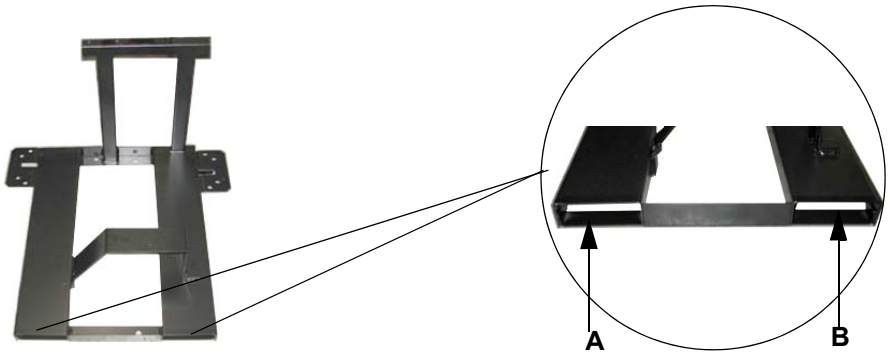
Handling the burner

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

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

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

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



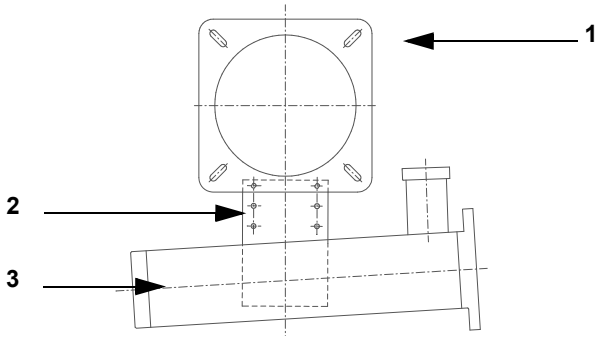
Set the upper side of the burner flange in a horizontal position, in order to obtain the correct inclination of the pre-heating tank

Key

1 Burner flange (upper side indicated)

2 Bracket

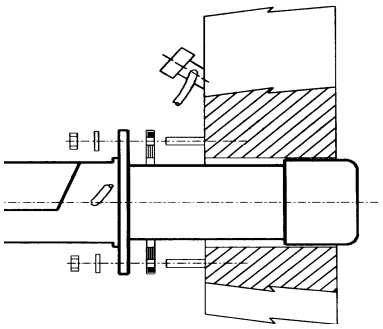
3 Pre-heating tank on the burner



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. (Fig. 2)
- 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.(Fig. 3)

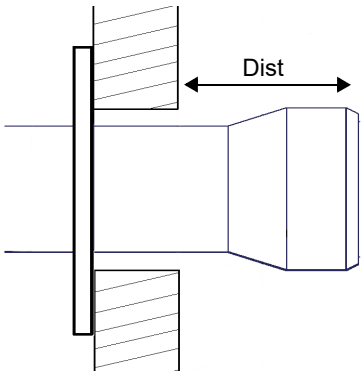


Fig. 2

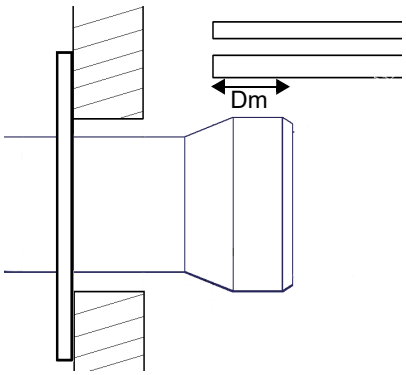


Fig. 3

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...).

CAUTION:Remove caps and covers from units before installation.

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)

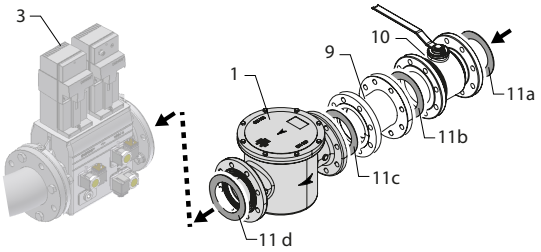


Fig. 4

Procedure to install the double gas valve unit: 2 flanges are required to mount the gas valve assemblies.

- Valves up to 2" are supplied with special threaded flanges.
- Valves of DN65 and above are supplied with PN16 flanges.

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.

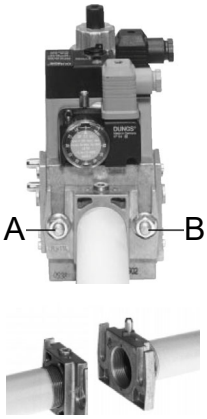
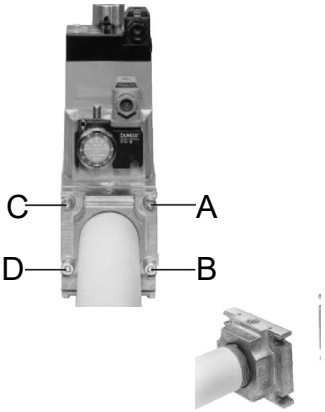
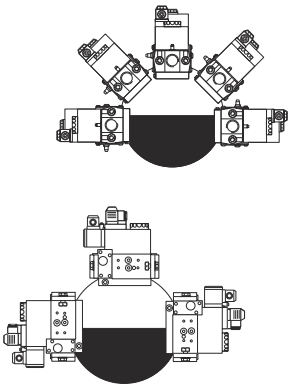
ATTENTION: it is reccomended to install the filter with gas flow parallel to the floor in order to prevent dust fall on the safety valve during maintenance operation.

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

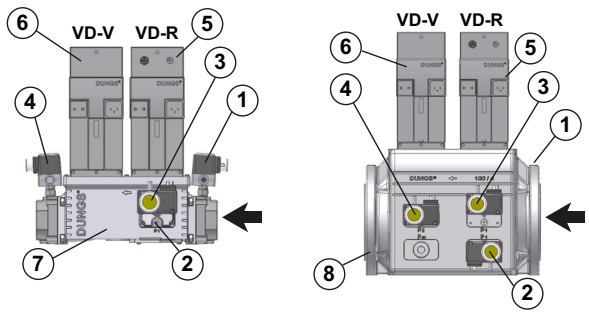
MultiBloc MB-DLE - Assembling the gas train

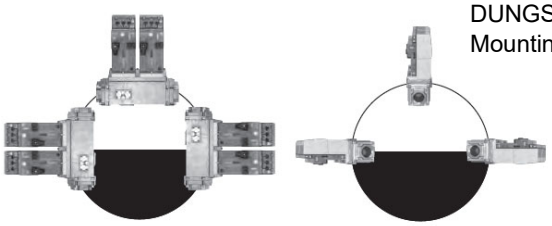
Mounting

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

	MB-DLE 405.. 412	***MB-DLE 415.. 420***	MOUNTING POSITIONS
			
Fig. 5	Fig. 6	Fig. 7	Fig. 8

DUNGS MBE - Components and position of pressure switches



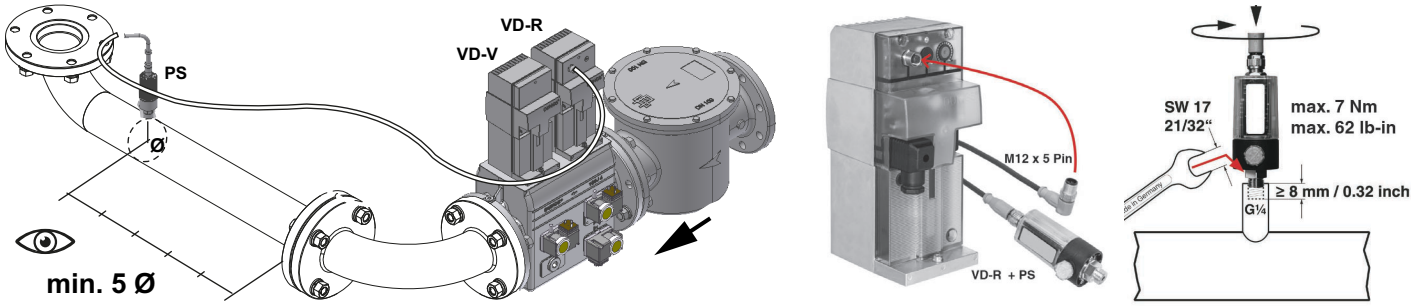


DUNGS MBE..
Mounting positions

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

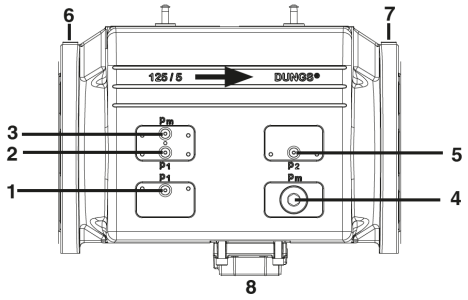
1 PGMIN minimum gas pressure switch
2 PGMIN minimum gas pressure switch (alternative to 1)
3 PGCP leakage control gas pressure switch
4 PGMAX maximum gas pressure switch
5 Actuator with integrated pressure stabiliser
6 On-Off actuator
7 Valve body (Threaded)
8 Valve body (Flange)

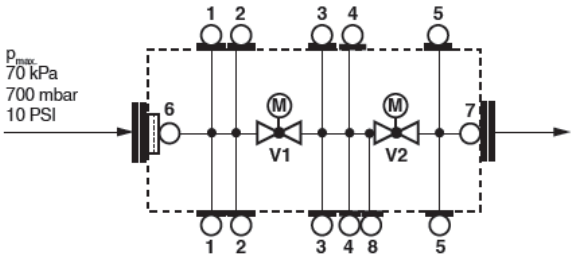
PS pressure sensor connection to VD-R actuator and gas train



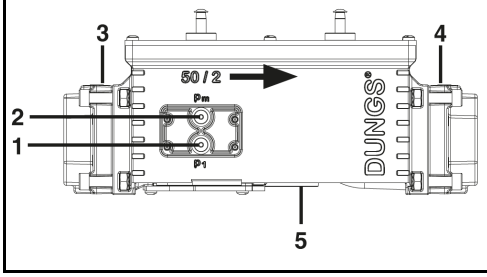
Attention: In the case of the MBE... valve, a pressure limit switch downstream of the safety valve is mandatory.

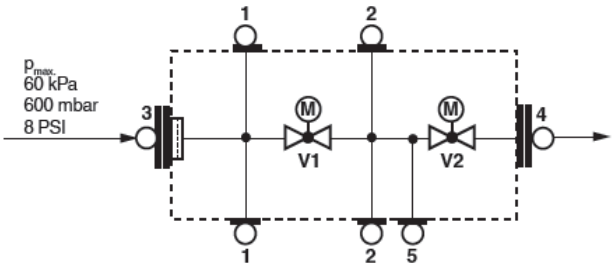
Pressure taps MultiBloc MBE





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

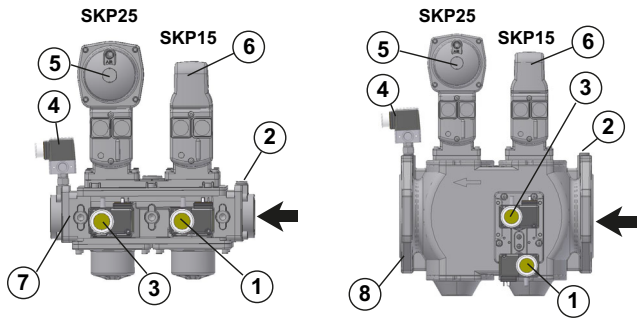


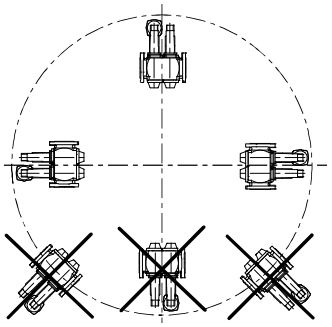


1, 2, 3, 4 Sealing plug G1/8 ISO 228
5 Locking screw
For version VB-2L only: connection for vent line **NPT 1**

Siemens VGD20.. e VGD40..

Components and position of pressure switches

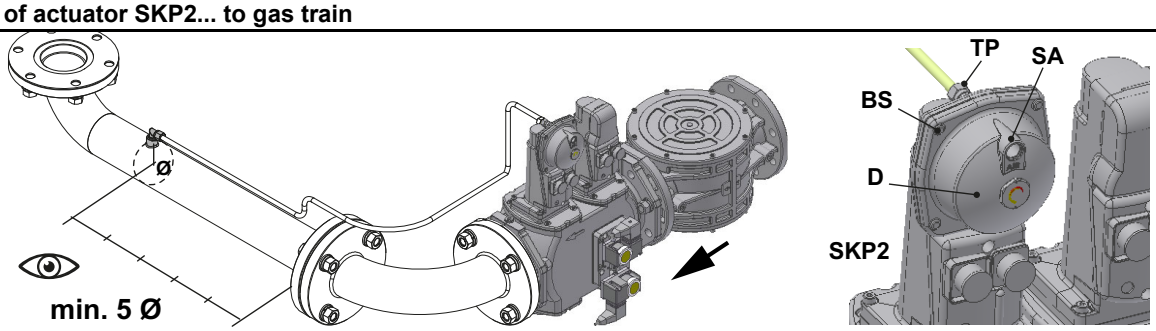




SIEMENS VGD..
Mounting positions

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

Connection of actuator SKP2... to gas train

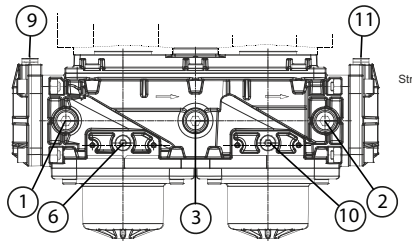


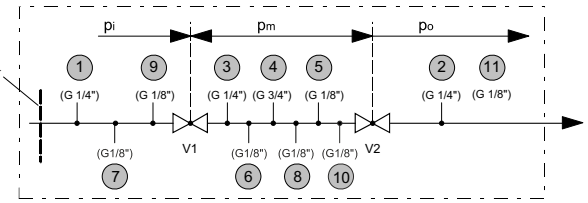
Siemens SKP2.. (pressure governor)

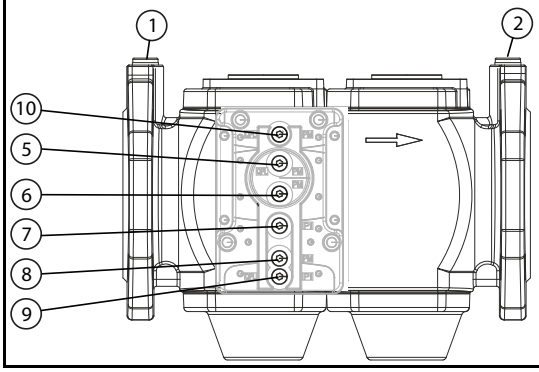
- Connect the reference gas pipe (**TP** in figure; 8mm-external size pipe supplied loose), to the gas pressure nipples placed on the gas pipe, downstream the gas valves: gas pressure must be measured at a distance that must be at least 5 times the pipe size.
- Leave the blowhole free (**SA** in figure).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

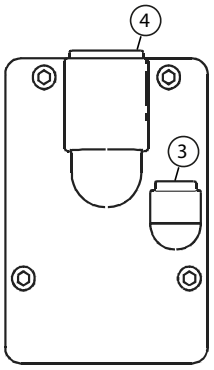
- D: pressure adjustment spring seat

*version with SKP2 (built-in pressure stabilizer)*Siemens VGD *Pressure taps*





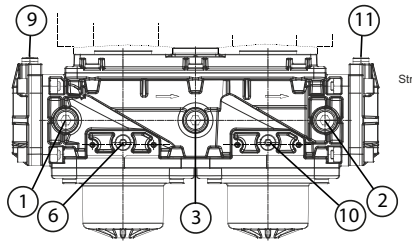


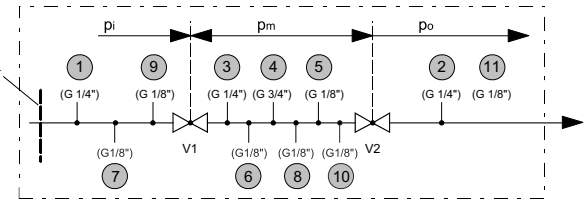


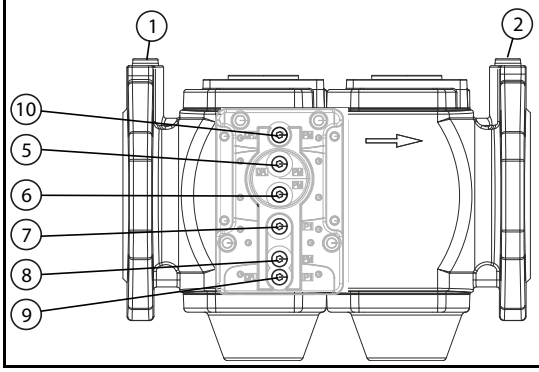
Legend
pi Inlet pressure
pm Pressure between valves
po Outlet pressure

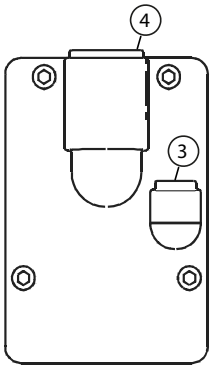
WARNING: removing the four screws BS causes the device to be unserviceable!

Siemens VGD *Pressure taps*









Legend
pi Inlet pressure
pm Pressure between valves
po Outlet pressure

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.

OIL TRAIN CONNECTIONS

The pump provided with the burner must be installed according to the hydraulic diagram.

Pumps	capacity [l/h]	power [kW]	speed [rpm]	connection	max outlet pressure [bar]	max inlet pressure (bar)
Kral KF 10 BCB	500	0,37	1500	DN25	10	2
Kral KF 15 BCB	800	0,55	1500	DN25	10	2
Kral KF 20 BCB	1100	0,55	1500	DN25	10	2
Cucchi FMG25	1400	0.75	1500	-	10	2

For further details see the manifacturer documentation.

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.

Connecting the pump

According to the pump provided, proceed as follows:

1 emove the closing nuts A and B on the inlet and return connections of the pump;

2 connect 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.

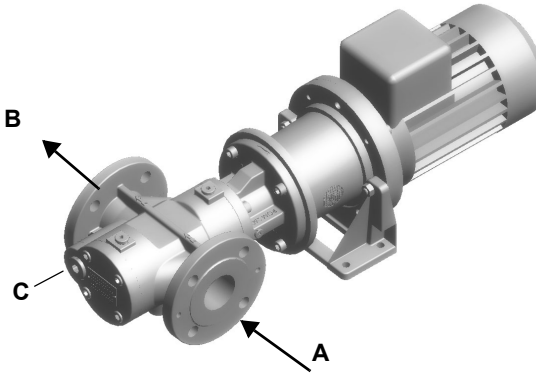
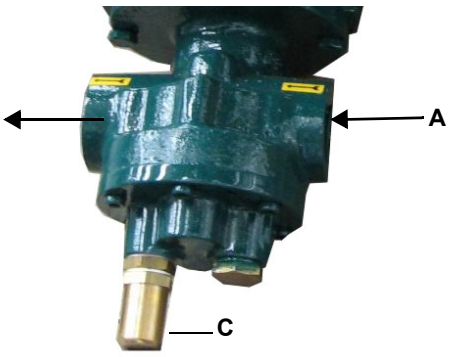


Fig. 9 - Kral



Legend
A - Inlet
B - Outlet
C - Overflow pressure adjusting screw

Fig. 10 - Cucchi

Suntec TV Pressure governor

Pressure adjustment

Remove cap-nut 1 and the gasket 2, unscrew the lock nut 4. To increase pressure, twist adjusting screw 3 clockwise.

To decrease the pressure, twist screw counterclockwise. Tight the lock nut 4, refit the gasket 2 and the cap nut 1.

Key

1 Cap nut
2 Gasket
3 Adjusting screw
4 Lock nut
5 Gasket

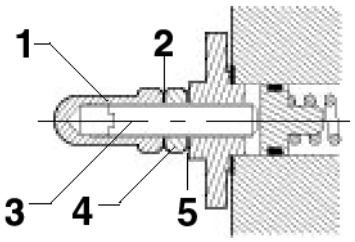


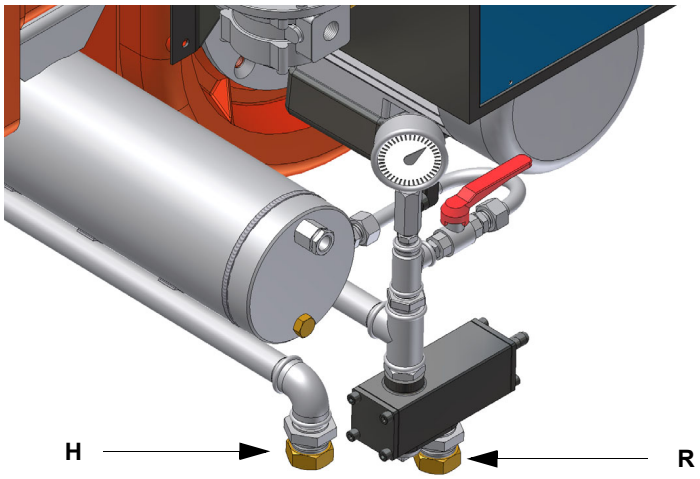
Fig. 11

Connecting the oil flexible hoses to the burner

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

1 remove the closing nuts **H** (on the heater) and **R** (on the oil pressure governor) of the inlet and return connections;

2 screw the rotating nut of the two flexible hoses on the burner **being careful to avoid exchanging the inlet and return lines**: see the arrows marked that show the inlet and the return.



Connecting the compressed air hoses

To connect the compressed air supply, refer to the following pictures



Flow governor with filter

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.

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

To execute the electrical connections, proceed as follows:

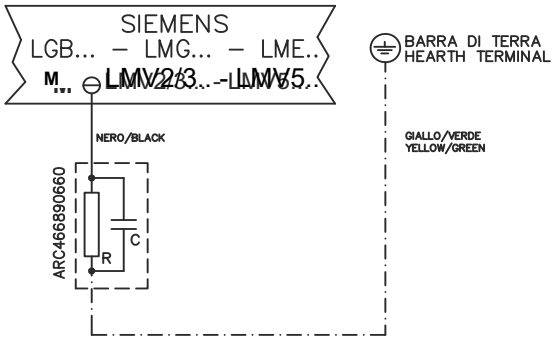
1 remove the cover from the electrical board, unscrewing the fixing screws;
2 execute the electrical connections to the supply terminal board as shown in the attached wiring diagrams;
3 check the direction of the fan motor (see next paragraph);
4 refit the panel cover.

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 elecrtical supply

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

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



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

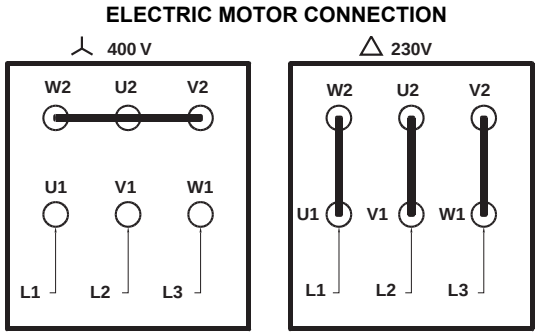
Rotation of electric motor

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

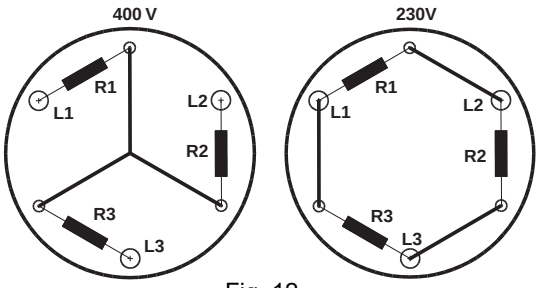


Fig. 12

8 - 12 kW

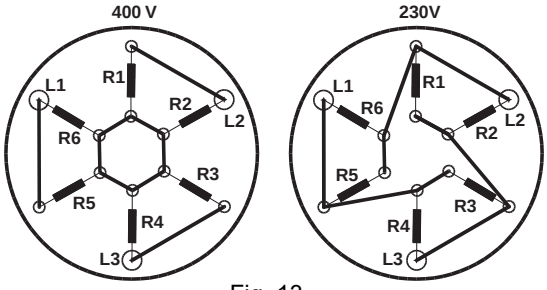


Fig. 13

18 - 24 kW

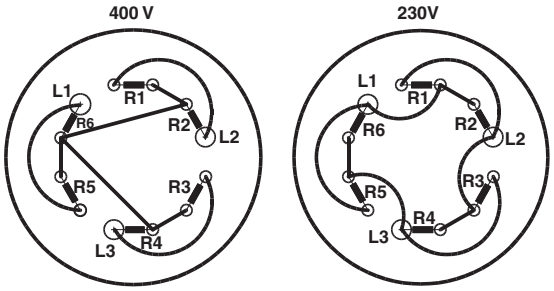


Fig. 14

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. A 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. B 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. A, 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. B roughly shows the inlet pump pressure according to the oil temperature.

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).

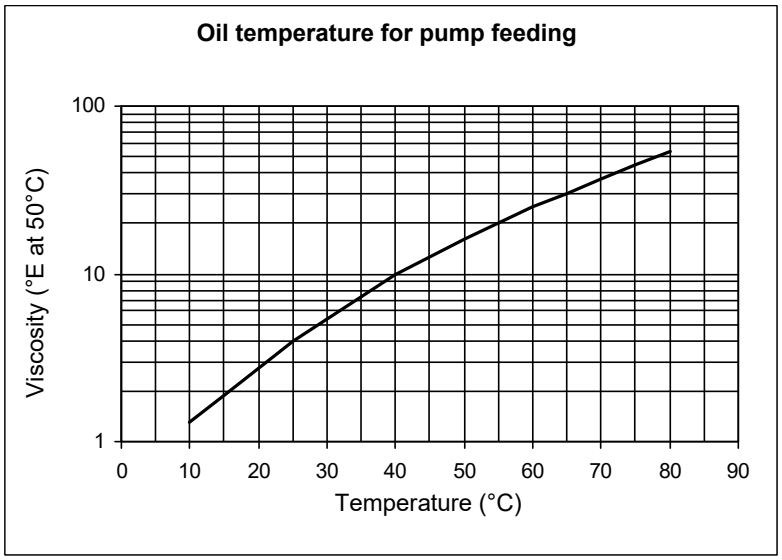


Fig. A

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. B 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.

Indicative diagram showing the oil pressure according to its temperature

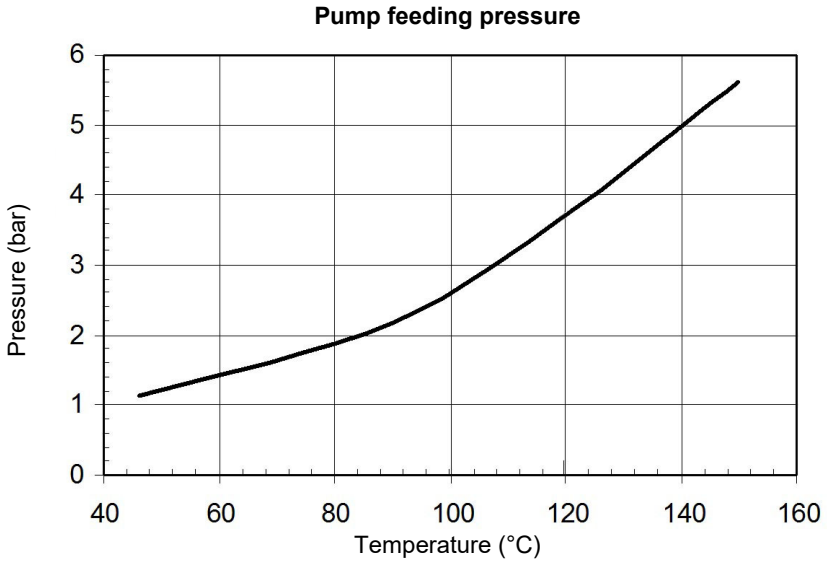


Fig. B

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
> 400 (50)	< 4000 (530)	1- 2	100

Tab. 1 - Supply pipeline hydraulic scheme 3ID0024, pump n.4

ATTENTION: Atomizing air pressure is tipically set at 0.1 ÷ 0.3 bar lower than oil pressure (RBY1025/1030).
Atomizing air pressure is tipically set at 0.5 ÷ 1 bar lower than oil pressure (RBY1040).

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

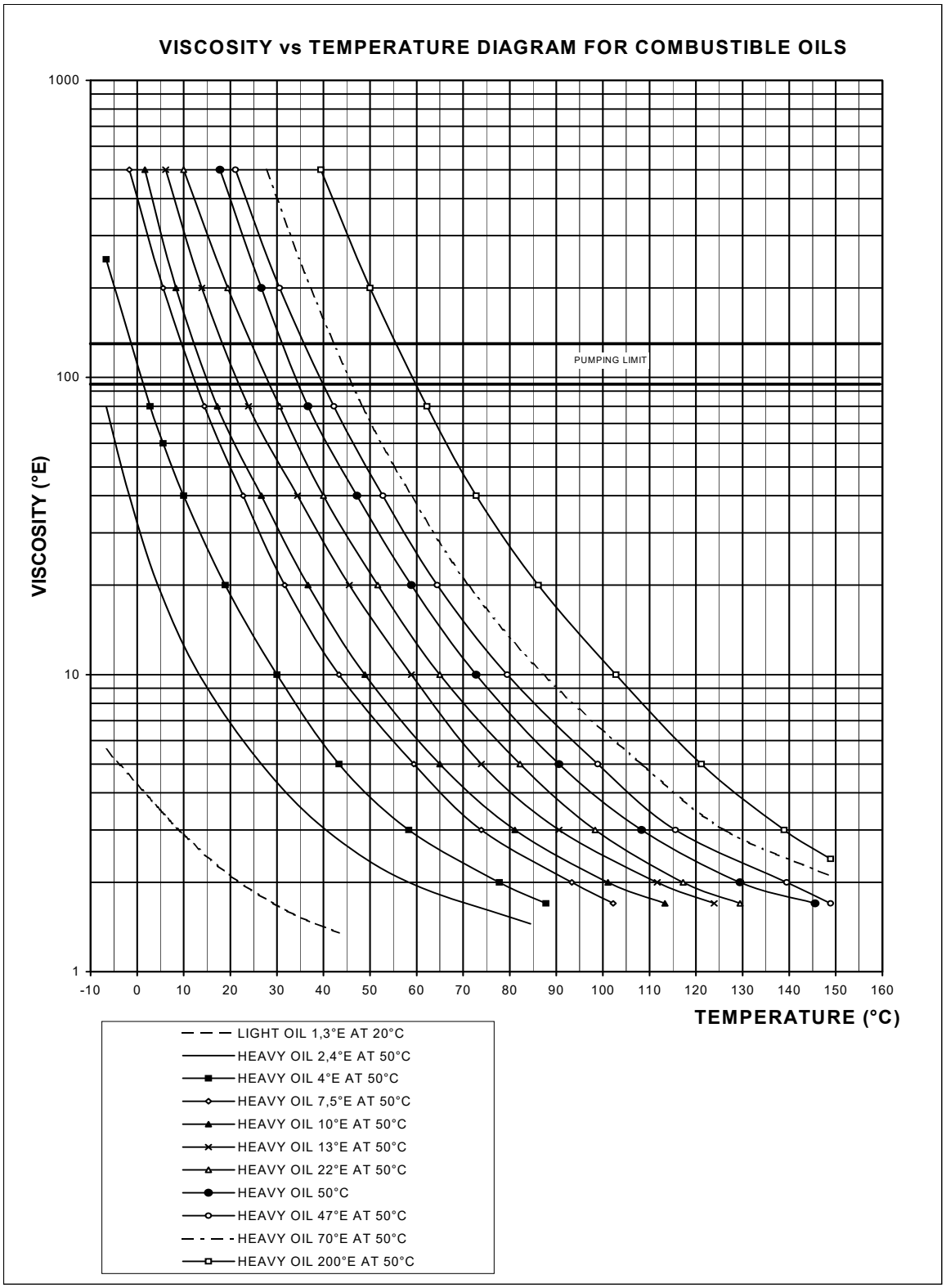
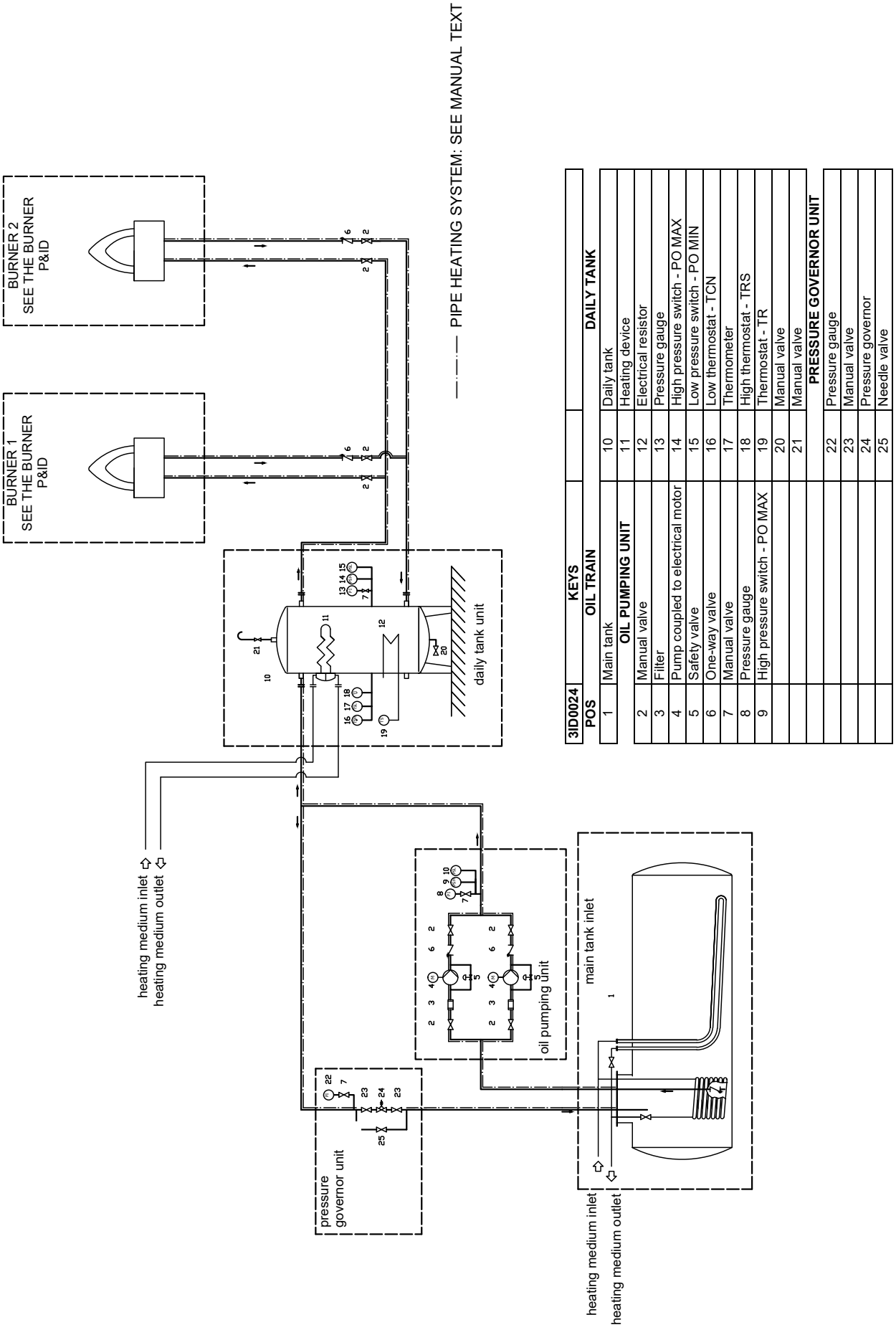

VISCOSITY vs TEMPERATURE DIAGRAM FOR COMBUSTIBLE OILS
VISCOSITY (°E)
1000
100
10
1
PUMPING LIMIT
-10
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
TEMPERATURE (°C)
LIGHT OIL 1,3°E AT 20°C
HEAVY OIL 2,4°E AT 50°C
HEAVY OIL 4°E AT 50°C
HEAVY OIL 7,5°E AT 50°C
HEAVY OIL 10°E AT 50°C
HEAVY OIL 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. 15

Fig. 16 - **Hydraulic diagram 3ID0024**



3ID0024	KEYS	
POS	OIL TRAIN	DAILY TANK
1	Main tank	10 Daily tank
	OIL PUMPING UNIT	11 Heating device
2	Manual valve	12 Electrical resistor
3	Filter	13 Pressure gauge
4	Pump coupled to electrical motor	14 High pressure switch - PO MAX
5	Safety valve	15 Low pressure switch - PO MIN
6	One-way valve	16 Low thermostat - TCN
7	Manual valve	17 Thermometer
8	Pressure gauge	18 High thermostat - TRS
9	High pressure switch - PO MAX	19 Thermostat - TR
		20 Manual valve
		21 Manual valve
		PRESSURE GOVERNOR UNIT
		22 Pressure gauge
		23 Manual valve
		24 Pressure governor
		25 Needle valve

PART III: OPERATION

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.**

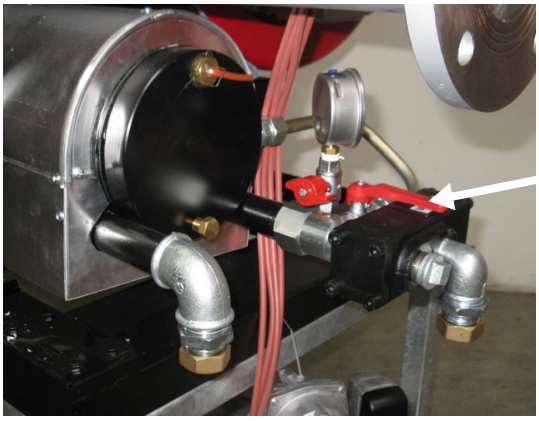
(First) Start-up preliminary operations - oil supply

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.

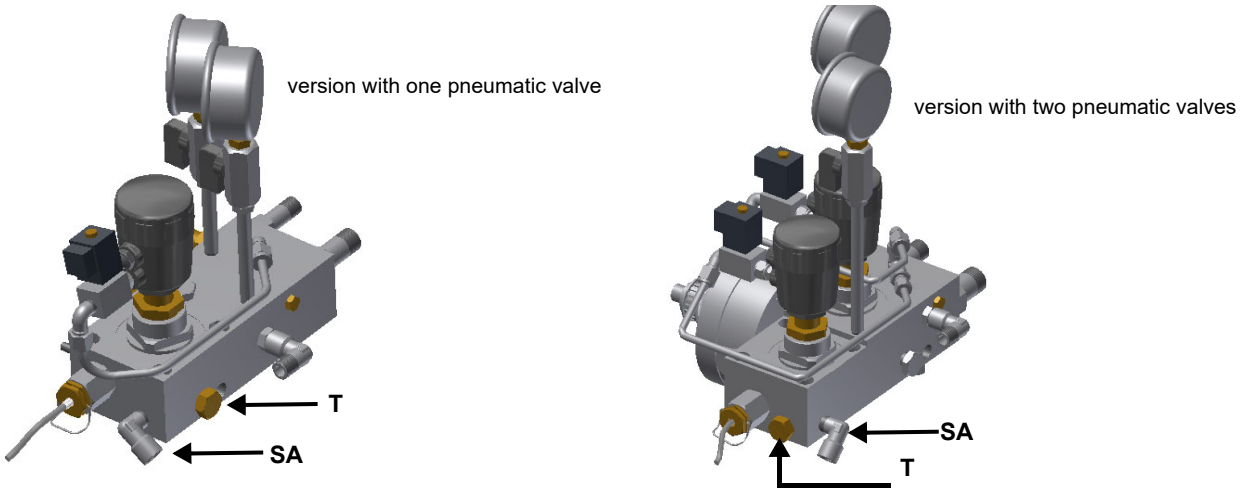
DANGER! Venting the air from the oil line can also be accompanied by oil leakage, with the consequent risks for the operator and the surrounding devices. Use appropriate caution.

The figure below shows nozzle flow valve. Before turn on the burner, open the manual valve.



Tank air vent

Before to give tension to the eletrical resistance, release the air inside the heaters throught the SA connection acting on the T cap.



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. 17 - Danfoss MCX

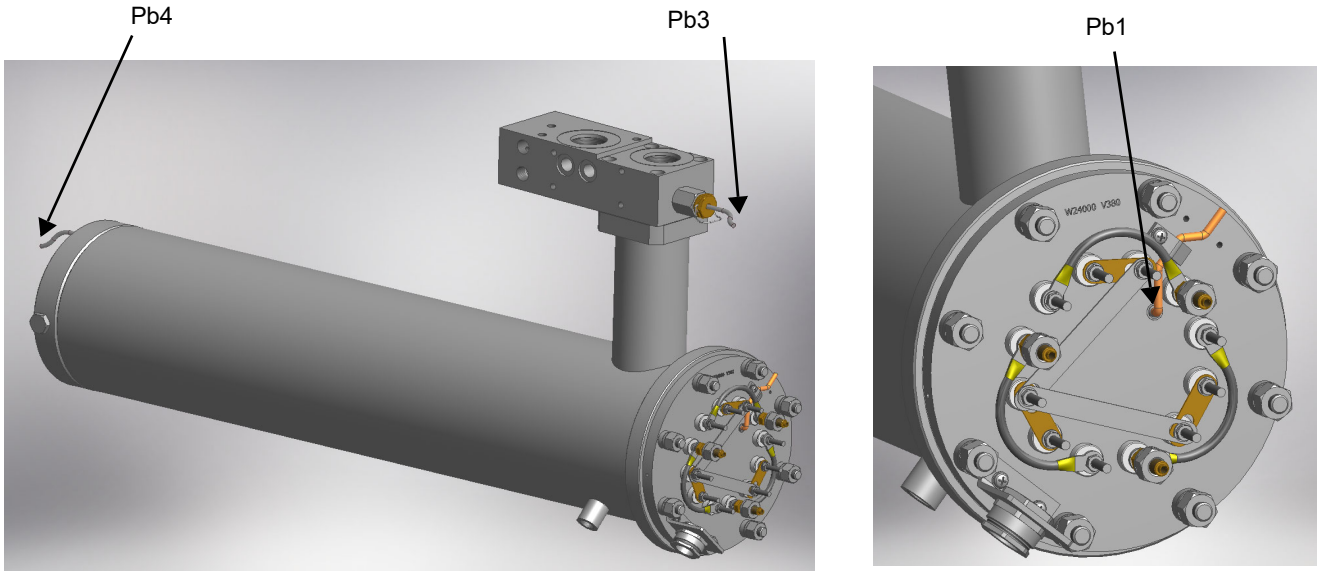


Fig. 18 - Probe connections (Danfoss MCX)

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 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.

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.

KPBY91-92-92 : Fluidics 15AG

KRBY510-515-520-525 : Fluidics 24Y

VISCOSITY AT 50 °C		OIL PRESSURE AFTER BURNER PUMP		OIL PRESSURE AFTER OIL METERING VALVE	
		min	max	min	max
°cSt (°E)		bar		°C	
	< 50 (7)	7	9	1	6
> 50 (7)	< 110 (15)	7	9	1	6
> 110 (15)	< 400 (50)	7	9	1	6
> 400 (50)	<4000 (530)	7	9	1	6

The pressure values shown in the table are intended as working range. In order to obtain a more accurate indication, please refer to the nozzle pressure-flow diagrams.

Compressed air adjustment

ATTENTION: set the pressure value about 1 bar, at the pressure gauge 47 (see Fig. 20). check it before open valve 16!

To start the burner set the oil and atomisation medium pressure at about 1 bar, as first trial. then, regulate the burner checking the combustion values at the chimney, according to the paragraph "operation", and adjust the starting point according to the regulation.

41



Fig. 19

47

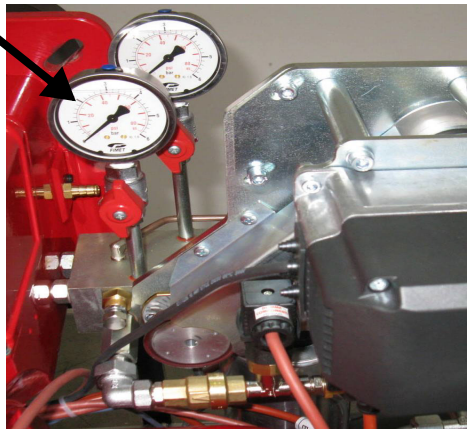
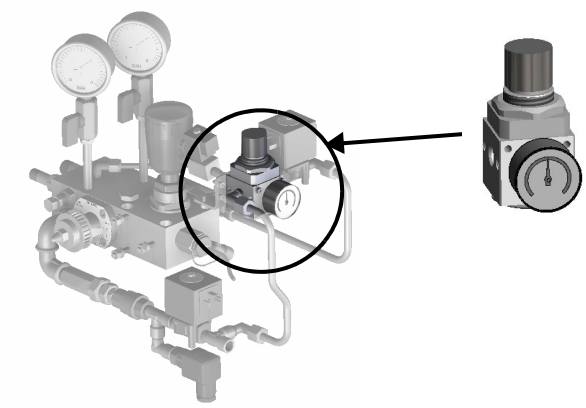


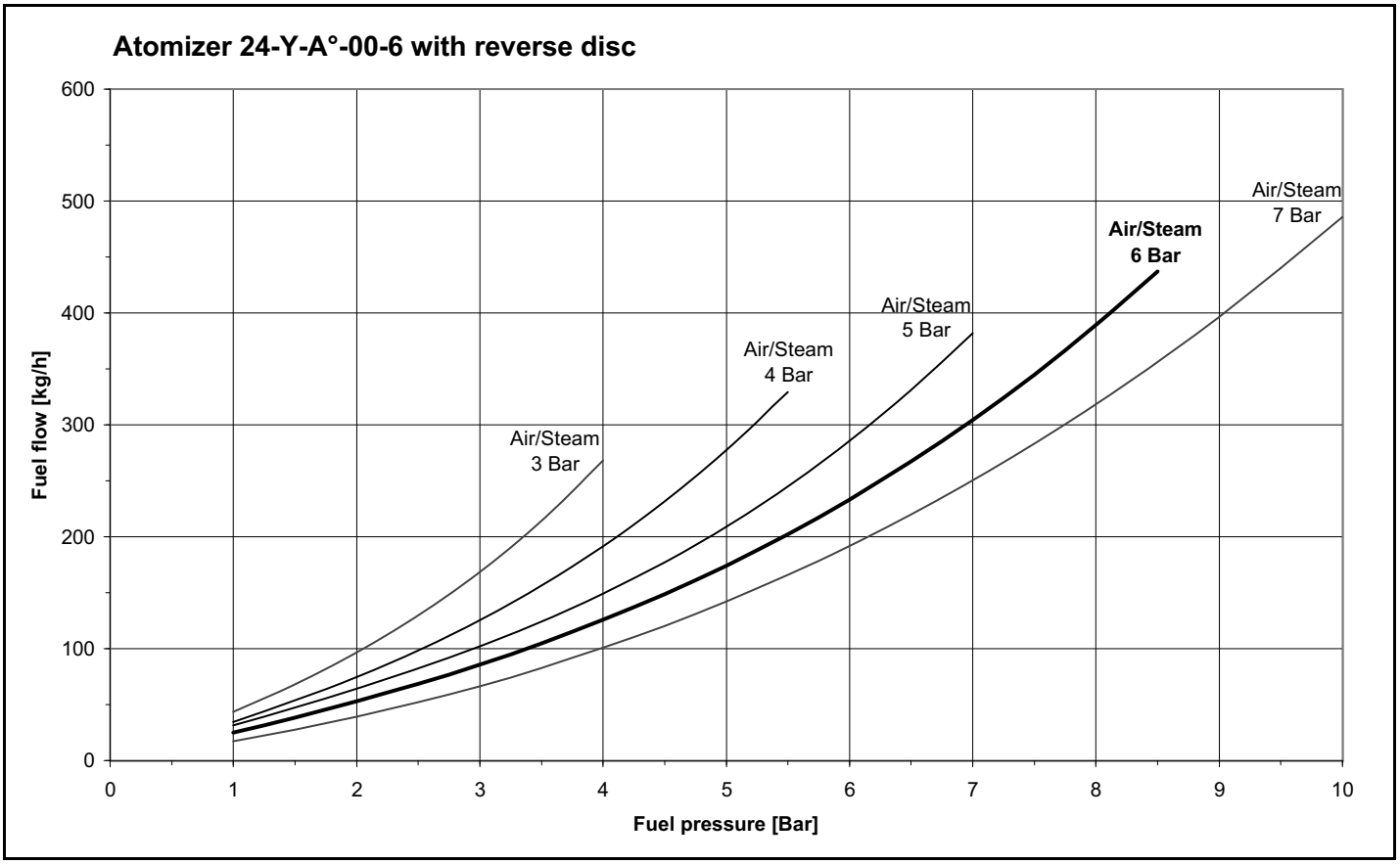
Fig. 20

ATTENTION: set the pressure value about 5-10 bar, at the pressure gauge on the governor 41 (see hydraulic diagram and Fig. 19)

Air valve for gun cleaning

As the flame is off, the purge valve opens automatically the compressed air to clean the gun. With this operation, the oil between the valves and the nozzle is drained. The air pressure for the gun cleaning must be about 1 bar, and should be setted throught the item in the below image.





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

15 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

14

ADJUSTING THE GAS VALVES GROUP

Multibloc MB-DLE

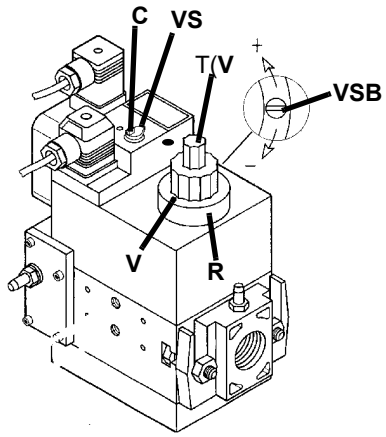
The multibloc unit is a compact unit consisting of two valves, gas pressure switch, pressure stabilizer and gas filter.

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

Do not use a screwdriver on the screw **VR**!

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

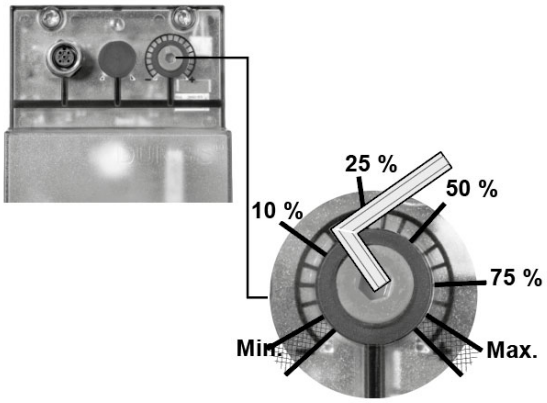
Note: the screw **VSB** must be removed only in case of replacemente of the coil.



MultiBloc MBE *Regulation VD-R whith PS*

Caution: check that the range of the installed spring is compatible with the gas pressure at the burner head (see appropriate diagram) to which must be added the back pressure and approx. 5 /10 mbar for various leaks and gas line.

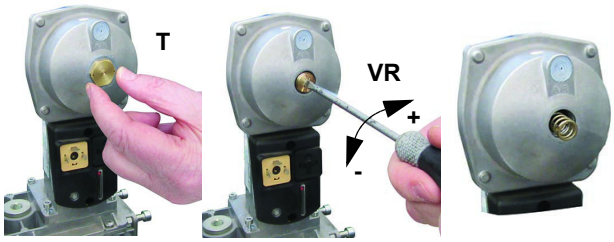
While making outlet pressure adjustments, do not exceed a value that creates a hazardous condition to the burner!



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

To set the output pressure of the VD-R regulator, turn the adjustment ring.
The position of the indicator in the dial indicates the value of the output pressure calculated as a percentage of the full scale of the PS sensor.

Siemens VGD../VRD.. version with SKP2



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

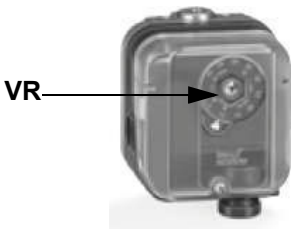
The pressure adjusting range, upstream the gas valves group, changes according to the spring provided with the valve group.
To replace the spring supplied with the valve group, proceed as follows:i

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.

Setting 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

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

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

Adjusting the maximum gas pressure switch (when provided)

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

1 remove the pressure switch plastic cover;

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

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

4 replace the plastic cover.

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.

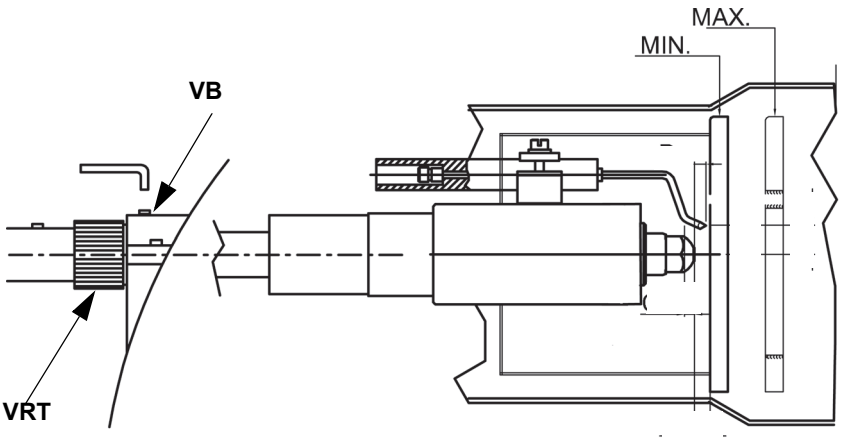
PGCP Gas leakage pressure switch (witn Siemens LDU/LME7x burner control/Siemens LMV Burner Management System)

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

Setting the combustion head position

CAUTION: perform these adjustments once the burner is turned off and cooled.

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.

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

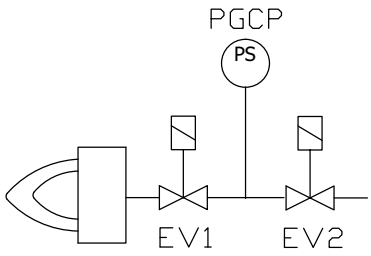
This paragraph describes the integrated proving system operation sequence:

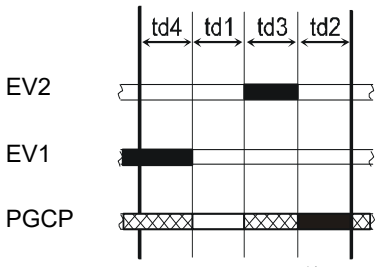
- At the beginning both the valves (EV1 and EV2) must be closed.
- Test space evacuating: EV1 valve (burner side) opens and keep this position for a preset time (td4), in order the bring the test space to ambient pressure.Test atmospheric pressure: EV1 closes and keep this position for a preset time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





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 LMV5.. related manual..

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

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	4.7 ÷ 6.7

Start-up procedure

1 Turn the burner on.

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

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

Main page

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

4 make the safety chain enabling the system to start up

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

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

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

Main page

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

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

Second page

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

Ld: load percentage (burner output).

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

OperationalStat
Operation
ManualOperation
Params & Display

Main menu

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

Normal operation
Status/Reset
Fault History
Lockout History

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

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

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

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

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

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

Fault History

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

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

alternating by an error message as:

O2 control and
limiter automat
deactivated

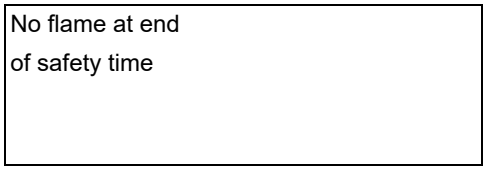
To see the other Fault History pages, press the arrow keys.
To exit the Fault History pages, press ESC.

Lockout History

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

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

alternating by an error message as:

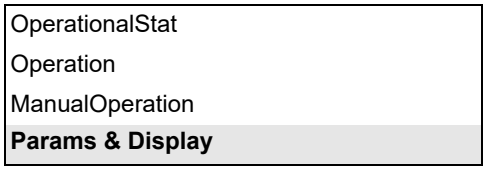


To see the other Lockout History pages, press the arrow keys.
To exit the Lockout History pages, press ESC.

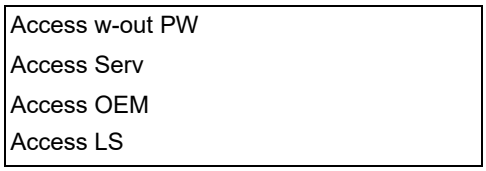
Setting the temperature/pressure set-point value

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

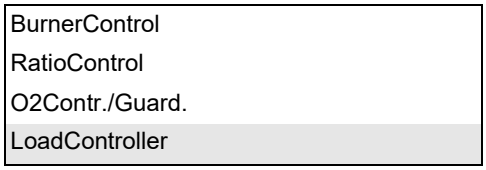
From the main page, enter the main menu by pressing the ESC key twice:



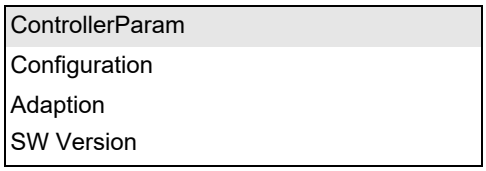
by means of the arrow keys, select “Params&Display”, press ENTER: the system will ask you to enter the proper password



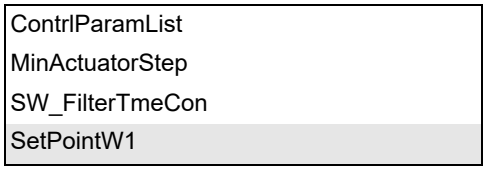
by means of the arrow keys, select “Access w-out pass” (access without password - user level), confirm by pressing ENTER.
The other levels require password reserved to the Technical Service, to the Manifacurer, etc.
The menu shown accessing without password is the following:



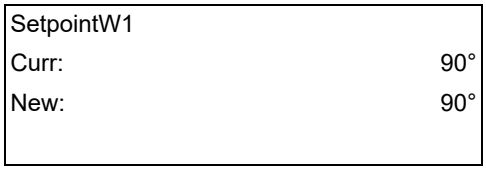
Choose “LoadController” and press ENTER: the following menu is shown:



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



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



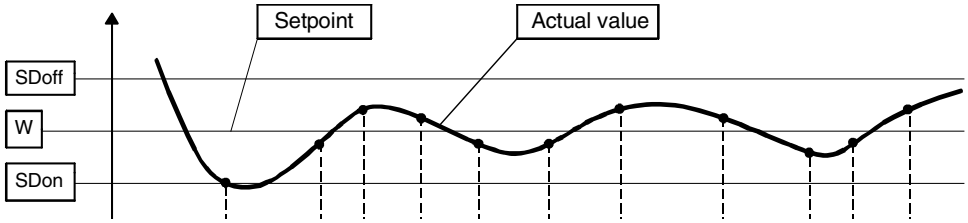
Curr: it shows the current set-point; use the arrows keys to change.

NOTE: the availabel range for this parameter depends on the probe provided; the unit measure of the detected value and its limits are bound up with parameters set at the “Service” level.

Once the new set-point is set, confirm by pressing ENTER, otherwise exit without changings by pressing ESC.

Press ESC to exit the set-point programming mode.

Once the temperature set-point W1 is imposed, set the Switch-on (SDon) and the Switch-off (SDoff) point of the 2-position controller:



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

SetpointW1
SetpointW2
SD_ModOn
SD_ModOff

the display will show:

SD_ModOn	
Curr::	1.0%
New:	1.0%

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

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

SetpointW1
SetpointW2
SD_ModOn
SD_ModOff

the display will show:

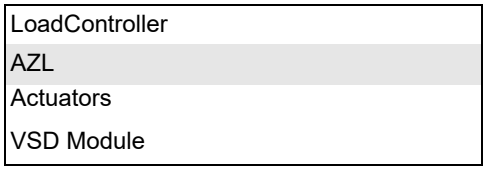
SD_ModOff	
Curr::	10.0%
New:	10.0%

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

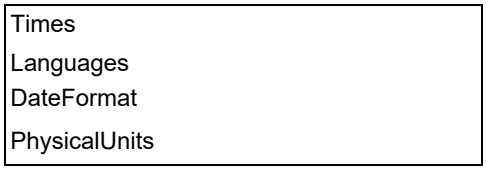
Change value, if needed, by means of the arrow keys; press ENTER to confirm and the press ESC to exit. Press only ESC to exit without changing. Press the ESC key until the following menu is shown:

BurnerControl
RatioControl
O2Contr./Guard.
LoadController

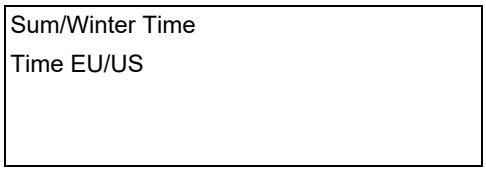
scroll this menu down until the tiem “AZL” is reached



confirm by pressing ENTER:

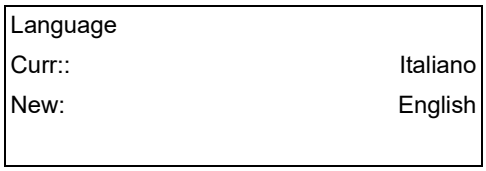


Times: it sets the “Summer (SUM) Time / Winter (WIN) Time” operation and the continent (EU - Europe; US - United States)



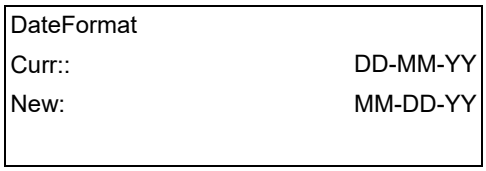
choose the Summertime/Wintertime mode desired and cofirm by pressing ENTER; press ESC to exit. Set the time zone (Time EU/US) in the same way.

Languages: it allows setting the current language

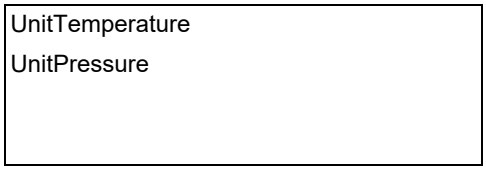


choose the desired language and cofirm by pressing ENTER; press ESC to exit.

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



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



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

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

System lockout

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

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

call the Technical Service and tell the message data.

Cold start thermal shock (CSTP)

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

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

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

Manual mode

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

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

OperationalStat
Operation
ManualOperation
Params & Display

Items to be set are the following:

SetLoad
Autom/Manual/Off

SetLoad: to set the required load percentage

SetLoad	
Curr::	0.0%
New:	20.0%

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

choose “Autom/Manual/Off

SetLoad
Autom/Manual/Off

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

three modes are provided:

Automatic: automatic operation

Burner on: manual operation

Burner off: burner in stand-by

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

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

For further details, see the LMV5x annexed manuals.

Fully-modulating burners

.To adjust the fully-modulating burners, use the **CMF** switch on the burner control panel (see next picture), instead of the **TAB** thermostat as described on the previous paragraphs about the progressive burners. Go on adjusting the burner as described before, paying attention to use the CMF switch intead of **TAB**.

The **CMF** position sets the oprating stages: to drive the burner to the high-flame stage, set CMF=1; to drive it to the low-flame stage, set CMF=2.



CMF

CMF = 0 stop at the current position
CMF = 1 high flame operation
CMF = 2 low flame operation
CMF = 3 automatic operation

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

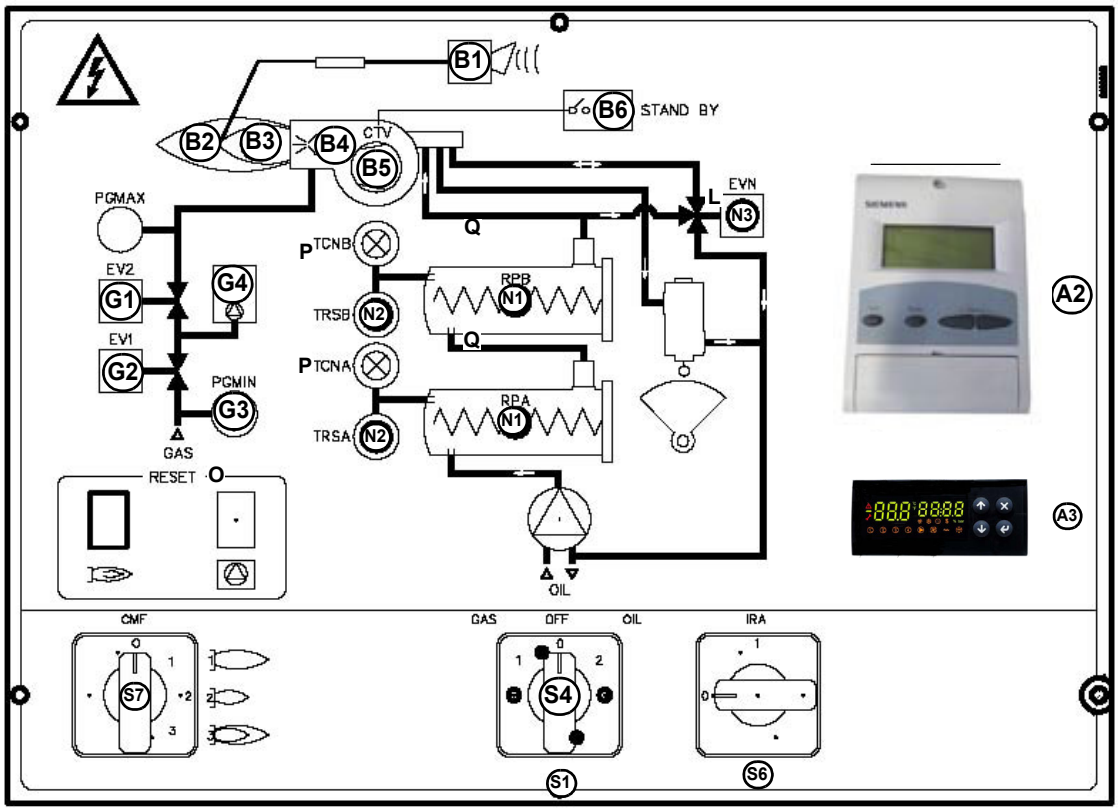


Fig. 21 - Burner front panel

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

PART IV: MAINTENANCE

Fuel selection:

- In order to start the burner with gas or oil, the operator must switch the selector on the burner control panel on (1) = gas, or (2) = oil.
  If the selector is set on (1) the gas cock must be open, while the oil cock must be closed. Viceversa if the selector is set on (2).
  CAUTION: if the fuel chosen is oil, be sure the cutoff valves on the feed and return pipes are open.

Operation

- At the beginning of the ignition cycle, the air damper moves to the fully open position, the fan and pump motor are started, and the pre-ventilation phase begins. During this phase, the complete opening of the air damper is indicated by indicator light B2.
- At the end of the preventive phase, the air damper moves to the ignition position and the ignition transformer is switched on (indicated by control lamp B4). In sequence, the oil valve is energised, the ignition transformer is switched off and control indicator B4 goes out.pia B2.
- The burner is ignited (control light B3 on) and after a few seconds, depending on the system requirements, the burner goes into high flame (control light B2 on) or low flame.
- Select the fuel by turning the switch **S1** on the burner control panel .
- Check that the control box is not in the lockout position; in case unlock it by pressing the relevant key (for further information on the LMV.., see the related manual).
- Check that the series of thermostats (or pressure switches) enable the burner to start up.

Gas Operation

- Check that the gas pressure in the circuit is high enough (LED **B1** on).
- The valve proving test begins.
- At the beginning of the start-up cycle the the air damper moves to the maximum opening, the fan motor starts and the pre-purge phase begins. During the pre-purge phase the complete opening of the air damper is signalled by the LED **B2** on the front panel.
- At the end of the pre-purge stage, the air damper moves to the ignition position, the ignition transformer is energised (signalled by LED **B4** on the panel) and, after few sec.onds the two gas valves EV1 and EV2 are energised (indicator lights **G1** and **G2** on). Few seconds after the opening of the gas valves, the ignition transformer is de-energised and LED **B4** is off.
- To move from the low flame position, the actuator opening time (<10 s) is controlled by the control box. When this time elapses, the burner operates according the plant needs.

Heavy oil Operation

- At the beginning of the start-up cycle the air damper moves to the maximum opening, the fan motor starts and the pre-purge phase begins. During the pre-purge phase the complete opening of the air damper is signalled by LED **B2** on the front panel.
- At the end of the pre-purge the air damper is brought to the ignition position and the ignition transformer is energised (signalled by LED **B4** on the panel). Few seconds later, the oil valve opens and the ignition transformer is de-energized (LED **B4** off).
- The burner is now operating and after some seconds the burner is automatically driven into high flame (LED **B2** on), or remains in low flame (LED **B3** on) according to the plant needs.

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



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

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

ROUTINE MAINTENANCE

- Check that the gas meter is not moving when the burner is off. In case it is rotating, look for possible leaks.
- Check that all parts in contact with combustive air (air box, protection mesh and Archimedean screw) are clean and free from any obstruction that might impede free afflux. Clean it with compressed air if available and/or a dry brush or cloths. Eventually wash it with non corrosive detergents.
- Check of blast tube; it must be substituted in case of obvious cracks or anomalous holes. Slight deformations that do not affect combustion may be tolerated
- Clean and examine the gas filter and replace it if necessary.
- Clean and examine the oil filter cartridge and replace it if necessary.
- Examine the flexible hoses and check for possible leaks.
- Check and clean if necessary the oil heaters and the tank, according to the fuel type and its use; remove the heaters flange fixing nuts and remove the heaters from the tank: clean by using steam or solvents and not metallic things.
- Remove and clean the combustion head.
- Examine and clean the ignition electrode, adjust and replace if necessary.
- Examine and clean the detection probe, adjust and replace if necessary.
- Examine the detection current.
- Remove and clean the heavy oil nozzle ***(Important: use solvents for cleaning, not metallic tools)*** and at the end of the maintenance procedures, after replacing the burner, turn it on and check the shape of the flame; if in doubt replace the nozzle. Where the burner is used intensively it is recommended to replace the nozzle as a preventive measure, at the begin of the operating season.
- Clean and grease joints and rotating parts.

IMPORTANT:Remove the combustion head before checking the ignition electrode.

- Remove and clean the compressed air regulator
- Remove and clean the oil regulator (if provided)
- At least every 2 months, or more often if needed, clean the room where the burner is installed.
- Avoid leaving installations, papers, nylon bags, etc., inside the room. They could be sucked by the burner and cause malfunctioning.
- Check that the room's vents are free from obstructions.



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

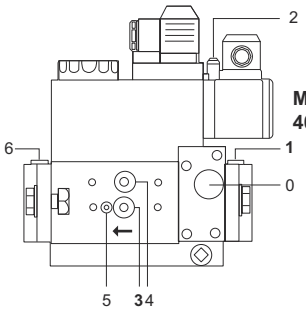


CAUTION: avoid the contact of steam, solvent and other liquids with the electric terminals of the resistor.
On flanged heaters, replace the seal gasket before refitting it.
Periodic inspections must be carried out to determine the frequency of cleaning.

Gas filter maintenance

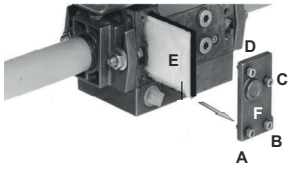
WARNING: Before opening the filter, close the manual cutoff valve downstream the filter and bleed the gas; check that inside the filter there is no pressurised gas.

Per pulire o sostituire il filtro gas procedere nel modo seguente:

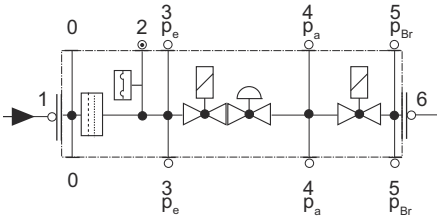


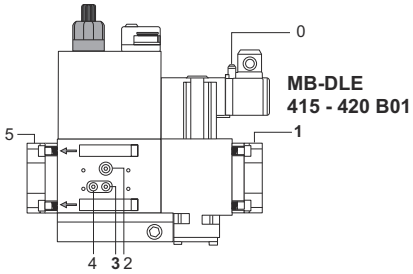
MB-DLE 405..412

0 Filter cover
1, 3,4 , 6 Screw plug G 1/8
2 Meter connection
5 Screw plug M14



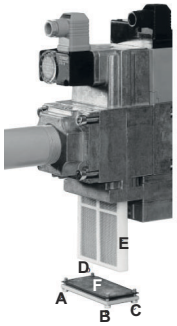
Pressure taps



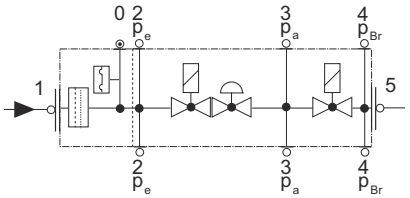


MB-DLE 415 - 420 B01

0, 1, 2, 3, 4, 5
Bouchon à vis G 1/8



Pressure taps



- Check the filter at least once a year!
- Change the filter if the pressure difference between pressure connection 1 and 3 (Fig. 1-Fig. 3)is $\Delta p > 10$ mbar.
- Change the filter if the pressure difference between pressure connection 1 and 3 (Fig. 1-Fig. 3) is twice as high compared to the last check.

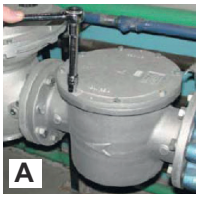
You can change the filter without removing the fitting.

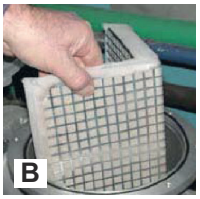
1 Interrupt the gas supply closing the on-off valve.
2 Remove screws 1 ÷ 4 using the Allen key n. 3 and remove filter cover 5 in Fig. 5.
3 Remove the filter 6 and replace with a new one.
4 Replace filter cover 5 and tighten screws 1 ÷ 4 without using any force and fasten.
5 Perform leakage and functional test, $p_{max.}$ = 360 mbar.

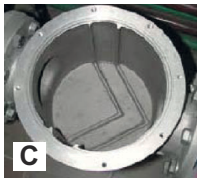
To clean or remove the filter, proceed as follows:

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;

be sure to replace the “O” ring into its place (C) and replace the cover fastening by the proper screws (A).

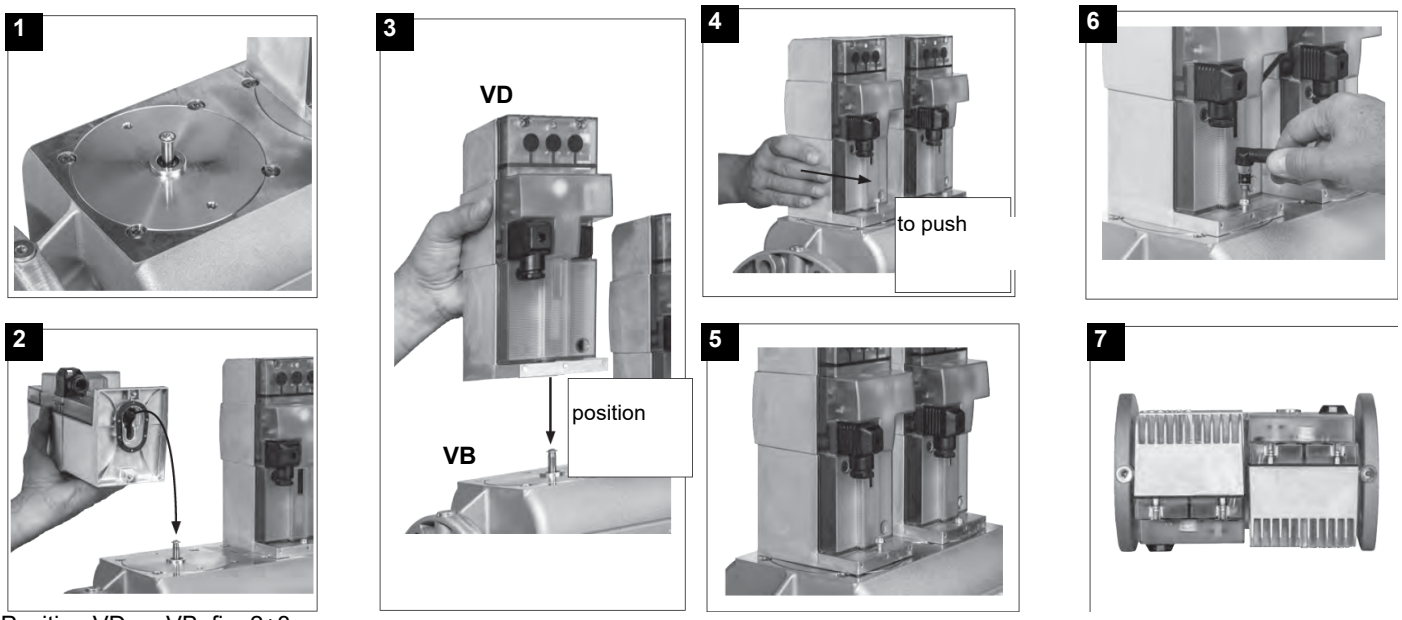






MultiBloc VD-V VD-R Mounting

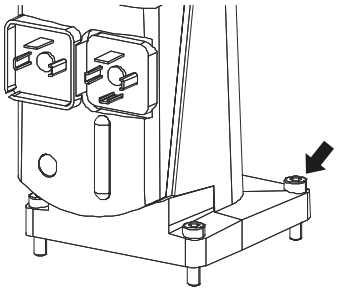
Fig. 22

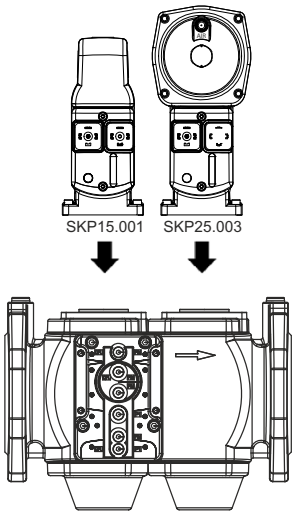


1. Position VD on VB, fig. 2+3.
2. Slide VD forward up to the stop, fig. 4.
3. Screw VD on with 2 M5 screws for each, max. 5 Nm/44 in.-lb., fig. 5/6.
4. VD can be mounted rotated by 180°, fig. 7.

Siemens SKP15 e SKP25 Mounting

Fig. 23



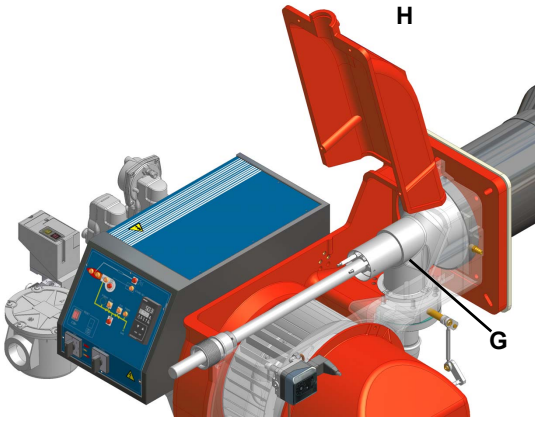


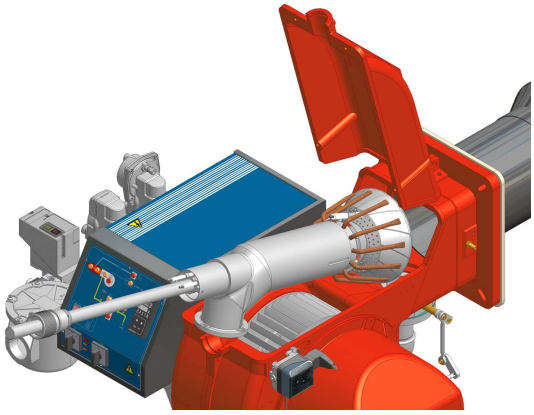
To replace the actuators, turn the screws as shown in the drawing.

Removing the combustion head

1. Remove the burner cover (**H**).
2. Slide the photocell out of its housing, disconnects the electrodes cables and the oil flexible hoses.
3. Unscrew the screws that block the gas collector (**G**), loose the oil gun joints and remove the combustion head assembly as shown on the following picture.
4. Clean the combustion head by means fo a vacuum cleaner; scrape off the scale by means fo a metallic brush .

Note: to remount the burner, floow the same procedure in the reversed order.





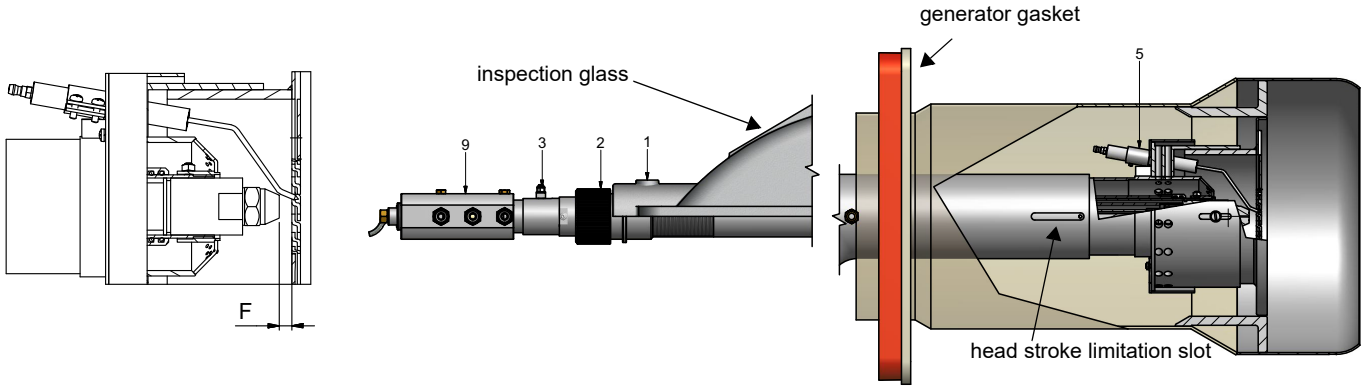
Removing the oil gun, replacing the nozzle and the electrodes

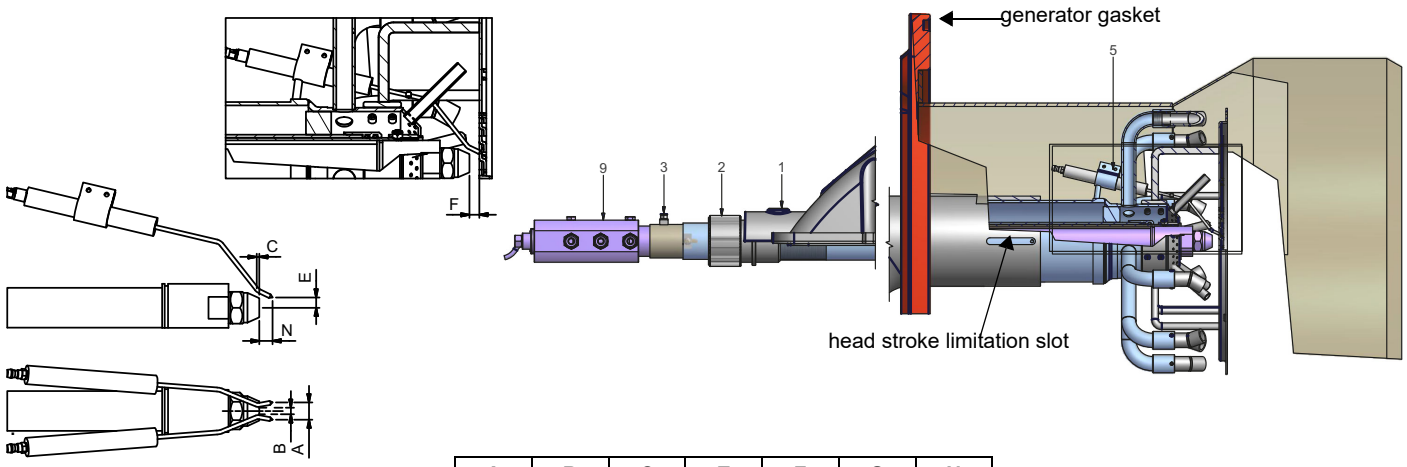
To remove the oil gun, proceed as follows:

1. remove the combustion head as described on the prevoius paragraph;
2. loosen the VL screw and remove the oil gun and the electrodes: check the oil gun, replace it if necessary;
3. after removing the oil gun, unscrew the nozzle and replace it if necessary;
4. in order to replace the electrodes, unscrew the electrodes fixing screws and remove electrodes: place the new electrodes being careful to observe the measures shown on : reassemlbe following the reversed procedure.

Adjusting the electrodes and nozzle position

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





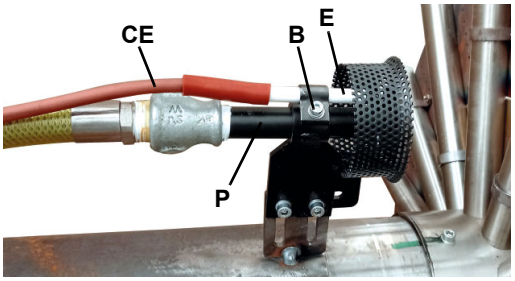
A	B	C	E	F	G	N
10÷15	3÷5	3÷4	10÷13	8÷10	0	10÷13

1 Move the combustion head “all-ahead” by the “head stroke limitation cam”, acting on the ring nut **M**; fix it by means of screw T;
2 place the nozzle to "**F**" mm (see table below) from the diffuser disc, acting on ring nut "**L**"
3 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).

Replacing the ignition electrode

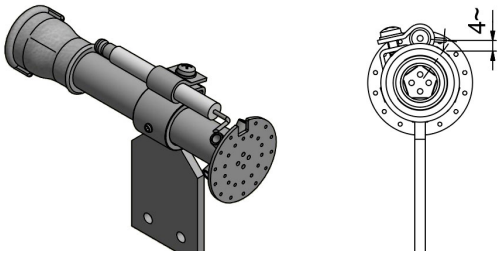
To replace the ignition electrode, proceed as follows:

1 Remove the burner cover
2 Disconnect the electrode (E) cable (CE)
3 Remove the combustion head (see par. “Removing the combustion head”)
4 Loose screw (B) that fasten the ignition electrode (E) to the burner pilot (P)
5 Remove the electrode and replace it, referring to the values quoted on figure



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

Ignition pilot electrode positions



ATTENTION: avoid contact between electrodes and metallic parts (blast tube, head, etc.), otherwise the burner’s operation would be compromised. Check the electrodes position after any intervention on the combustion head.

WARNING: The typical pressure to be adjusted at the pilot gas train pressure stabiliser is approx. 40-50 mbar. However, the correct value is to be adjusted during the first burner start-up phase as burner ignition may vary depending on its operating conditions.

Checking the detection current

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

Minimum detection signal: 3.5Vdc

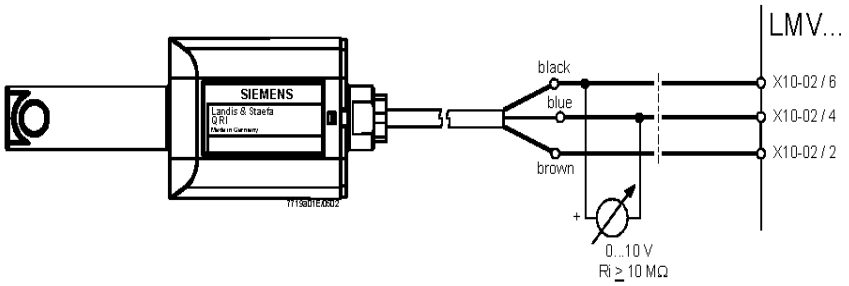


Fig. 24 - Detection with detector QRI...

Cleaning and replacing the detection photocell

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;
6 replace the photocell into its slot.



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

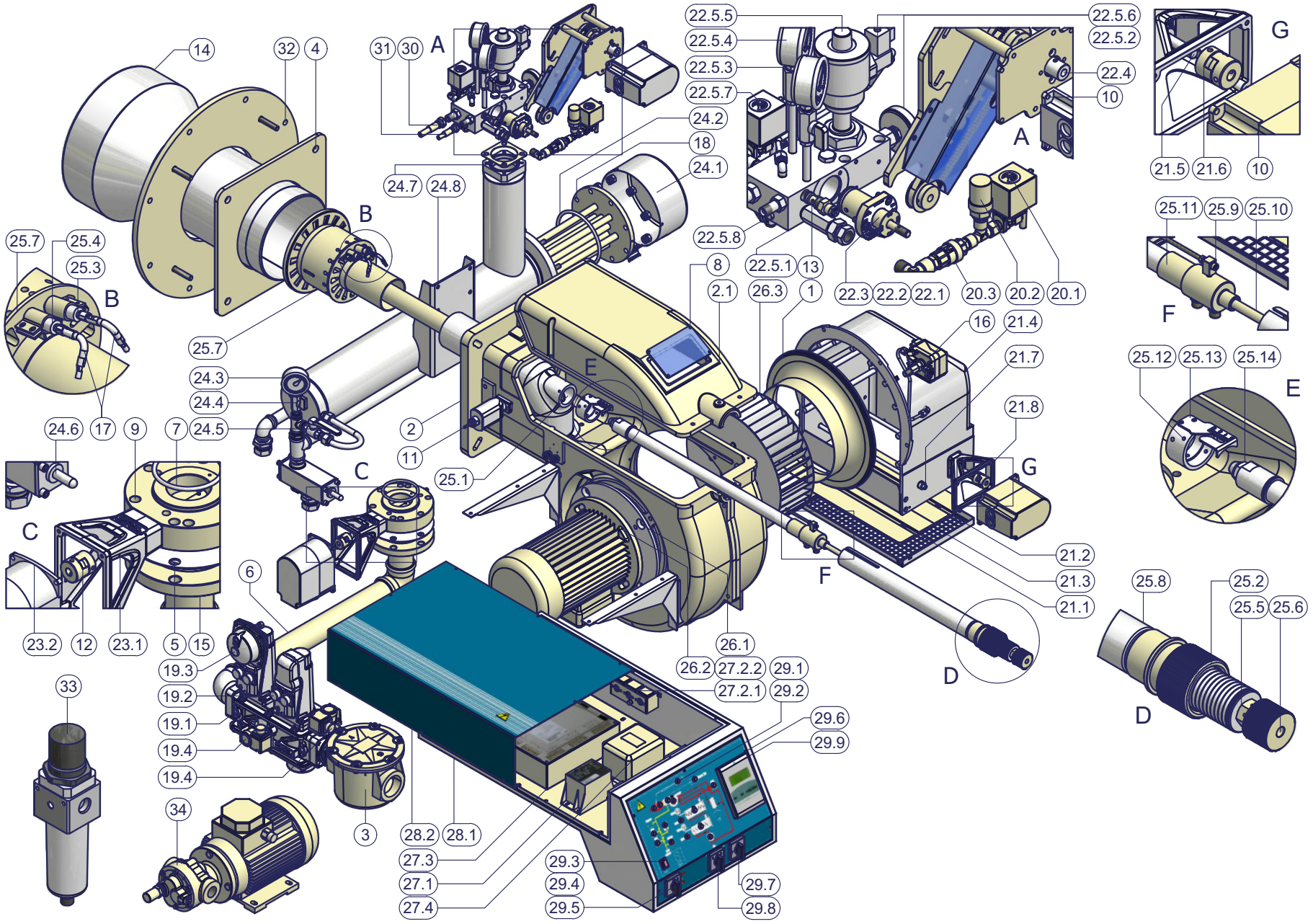
Heavy oil operation

	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			●	●			●	

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 GIVECONSENT TO START	DOESEN'T SWITCH TO HIGH FLAME	DOESEN'T RETURN IN LOW FLAME	LOCK-OUT DURING OPERATION	TTURNS OF AND REPEATS CYCLE DURING OPERATION
MAIN SWITCH OPEN	●										
LACK OF GAS	●			●							
MAXIMUM GAS PRESSURE SWITCH DEFECTIVE	●		●								
THERMOSTATS/PRESSURE SWITCHES DEFECTIVES	●			●							●
OVERLOAD TRIPPED INTERVENTION	●										
AUXILIARIES FUSE INTERRUPTED	●										
DEFECTIVE CONTROL BOX	●	●	●			●				●	
DEFECTIVE ACTUATOR	●	●	●								
AIR PRESSURE SWITCH FAULT OR BAD SETTING	●					●	●			●	
MINIMUM GAS PRESSURE SWITCH DEFECTIVE OR GAS FILTER DIRTY	●			●	●		●				●
IGNITION TRANSFORMER FAULT			●								
IGNITION ELECTRODES BAD POSITION			●								
BUTTERFLY VALVE BAD SETTING			●			●					
DEFECTIVE GAS GOVERNOR			●	●	●						●
GAS VALVE DEFECTIVE			●								
BAD CONNECTION OR DEFECTIVE HIGH/LOW FLAME THERMOSTAT OR PRESSURE SWITCH								●	●		
ACTUATOR CAM WRONG SETTING							●	●	●		
UV PROBE DIRTY OR DEFECTIVE			●			●				●	

BURNER EXPLODED VIEW **KPBY9x**

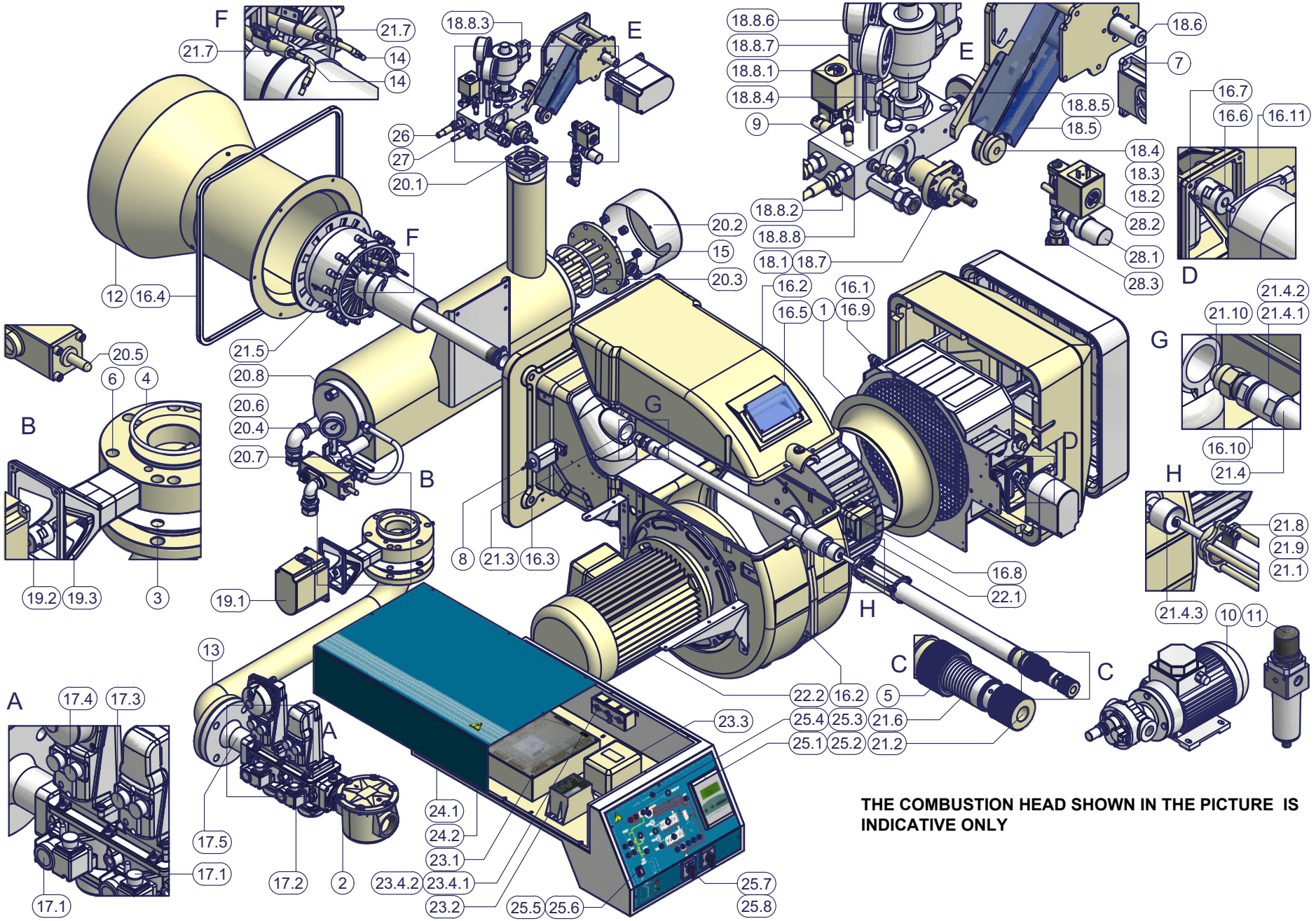


KPBY9x

POS.	DESCRIPTION
1	AIR INLET CONE
2	BURNER HOUSING
2.1	COVER
3	GAS FILTER
4	GENERATOR GASKET
5	GASKET
6	THREADED PIPE
7	O RING
8	INSPECTION GLASS
9	BUTTERFLY GAS VALVE
10	ACTUATOR
11	PHOTOCELL
12	COUPLING
13	AIR GOVERNOR
14	BLAST TUBE
15	FLANGED PIPE
16	AIR PRESSURE SWITCH
17	IGNITION CABLE
18	RESISTOR
19.1	GAS VALVE HOUSING
19.2	SKP ACTUATOR
19.3	SKP ACTUATOR
19.4	GAS PRESSURE
20.1	SOLENOID VALVE
20.2	AIR PRESSURE SWITCH
20.3	ONE-WAY VALVE
21.1	AIR INTAKE DAMPER
21.2	AIR INTAKE DAMPER
21.3	NET
21.4	AIR INTAKE
21.5	LOUVER SHAFT
21.6	COUPLING
21.7	LOUVER SHAFT
21.8	BRACKET

POS.	DESCRIPTION
22.1	GASKET
22.2	GASKET
22.3	PRESSURE GOVERNOR
22.4	CONNECTOR
22.5.1	OIL MANIFOLD
22.5.2	THERMOMETER
22.5.3	CUTOFF MANUAL VALVE
22.5.4	PRESSURE GAUGE
22.5.5	PNEUMATIC OIL VALVE
22.5.6	COMPRESSED AIR SOLENOID VALVE
22.5.7	SOLENOID VALVE
22.5.8	VALVE
23.1	BRACKET
23.2	ACTUATOR
24.1	COVER
24.2	O RING
24.3	PRESSURE GAUGE
24.4	CUTOFF MANUAL VALVE
24.5	CUTOFF MANUAL VALVE
24.6	PRESSURE GOVERNOR
24.7	GASKET
24.8	OIL PRE-HEATER
25.1	GAS MANIFOLD
25.2	RING NUT
25.3	ELECTRODE
25.4	ELECTRODE
25.5	BRACKET
25.6	RING NUT
25.7	COMBUSTION HEAD
25.8	COMBUSTION HEAD EXTESION
25.9	HEAD ADJUSTING SCREW
25.10	HEAD ADJUSTING ROD
25.11	NOZZLE HOLDER
25.12	BUSH

POS.	DESCRIPTION
25.13	BRACKET
25.14	NOZZLE
26.1	MOTOR MOUNTING FLANGE
26.2	MOTOR
26.3	FAN WHEEL
27.1	POWER PACK
27.2.1	THERMOSTAT
27.2.2	THERMOSTAT
27.3	CONTROL BOX
27.4	IGNITION TRANSFORMER
28.1	BOARD
28.2	COVER
29.1	LIGHT
29.2	LIGHT
29.3	PROTECTION
29.4	LOCK-OUT RESET BUTTON
29.5	SWITCH
29.6	FRONT CONTROL PANEL
29.7	SWITCH
29.8	SWITCH
29.9	CONTROL PANEL
30	FLEXIBLE HOSE
31	FLEXIBLE HOSE
32	COUNTERFLANGE
33	FILTER
34	PUMP



THE COMBUSTION HEAD SHOWN IN THE PICTURE IS INDICATIVE ONLY

POS.	DESCRIPTION
1	AIR INLET CONE
2	GAS FILTER
3	GASKET
4	O RING
5	RING NUT
6	BUTTERFLY GAS VALVE
7	ACTUATOR
8	PHOTOCELL
9	AIR GOVERNOR
10	PUMP
11	FILTER
12	BLAST TUBE
13	FLANGED PIPE
14	IGNITION CABLE
15	RESISTOR
16.1	NET
16.2	BURNER HOUSING
16.3	FLANGE
16.4	CERAMIC FIBRE ROPE
16.5	INSPECTION GLASS
16.6	COUPLING
16.7	BRACKET
16.8	AIR PRESSURE SWITCH
16.9	AIR INTAKE DAMPER
16.10	BRACKET
16.11	ACTUATOR
17.1	GAS PRESSURE
17.2	GAS VALVE HOUSING
17.3	SKP ACTUATOR
17.4	SKP ACTUATOR
17.5	FLANGED PIPE
18.1	GASKET
18.2	BAND WHEEL
18.3	BELT

POS.	DESCRIPTION
18.4	BAND WHEEL
18.5	SUMP
18.6	CONNECTOR
18.7	PRESSURE GOVERNOR
18.8.1	SOLENOID VALVE
18.8.2	VALVE
18.8.3	COMPRESSED AIR SOLENOID VALVE
18.8.4	PNEUMATIC OIL VALVE
18.8.5	THERMOMETER
18.8.6	PRESSURE GAUGE
18.8.7	MANUAL VALVE
18.8.8	OIL MANIFOLD
19.1	ACTUATOR
19.2	COUPLING
19.3	BRACKET
20.1	GASKET
20.2	COVER
20.3	O RING
20.4	PRESSURE GAUGE
20.5	PRESSURE GOVERNOR
20.6	MANUAL VALVE
20.7	CUTOFF MANUAL VALVE
20.8	OIL PRE-HEATER
21.1	HEAD ADJUSTING ROD
21.2	RING NUT
21.3	GAS MANIFOLD
21.4	NOZZLE HOLDER
21.4.1	NOZZLE HOLDER
21.4.2	NOZZLE HOLDER
21.4.3	OIL MANIFOLD
21.5	COMBUSTION HEAD
21.6	COMBUSTIONE HEAD EXTENSION
21.7	ELECTRODE
21.8	BUSH

POS.	DESCRIPTION
21.9	ROD
21.10	NOZZLE
22.1	FAN WHEEL
22.2	MOTOR
23.1	CONTROL BOX
23.2	POWER PACK
23.3	IGNITION TRANSFORMER
23.4.1	THERMOSTAT
23.4.2	THERMOSTAT
24.1	BOARD
24.2	COVER
25.1	CONTROL PANEL
25.2	FRONT CONTROL PANEL
25.3	LIGHT
25.4	LIGHT
25.5	LOCK-OUT RESET BUTTON
25.6	PROTECTION
25.7	SWITCH
25.8	SWITCH
26	FLEXIBLE HOSE
27	FLEXIBLE HOSE
28.1	AIR PRESSURE SWITCH
28.2	SOLENOID VALVE
28.3	ONE-WAY VALVE



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

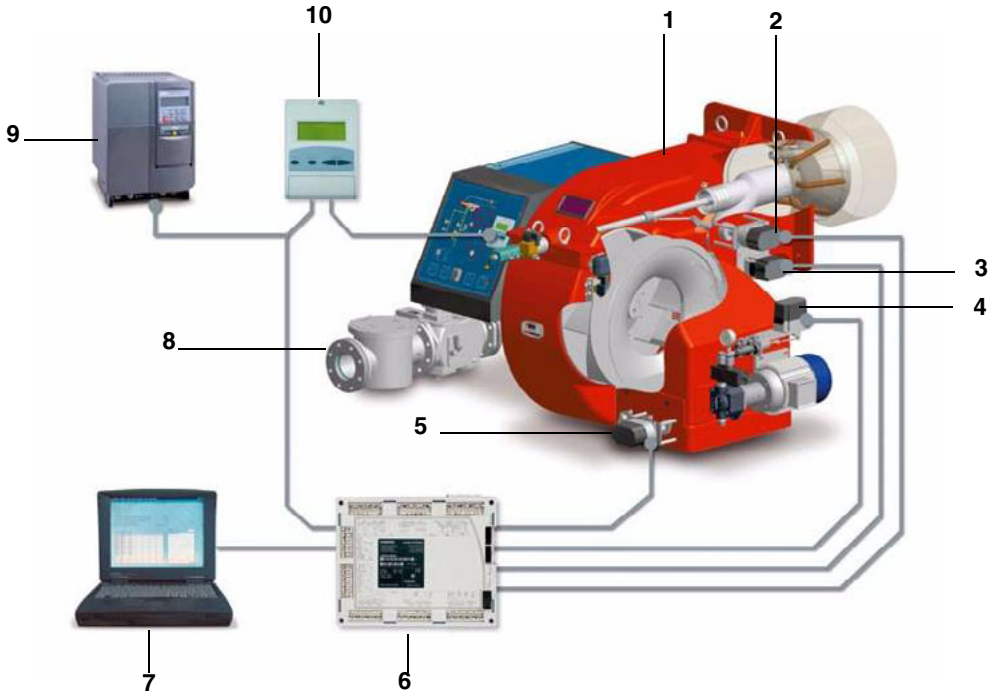
Siemens LMV 5x



Service manual

M12920CB Rev. 1 08/2009

BURNERS PROVIDED WITH SIEMENS LMV5



Keys

1 Burner
2 Combustion head actuator
3 Gas butterfly valve actuator
4 Oil pressure governor actuator
5 Air damper actuator
6 Siemens LMV burner control
7 Personal Computer
8 Gas train
9 Inverter
10 Siemens AZL User interface

The control system is made of the Siemens LMV central unit (6) that performs all the burner control functions and of the Siemens AZL local programming unit (10) that interfaces the system with the user.

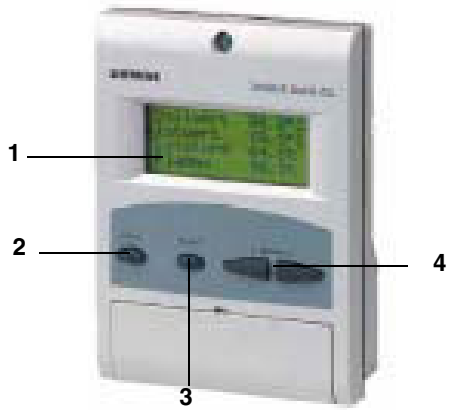
Main features:

- no mechanical linkages
- built-in burner control box
- built-in gas proving system
- more flame checking devices available for several applications
- PID load controller
- up to six actuators can be controlled. Each of them is independent for the best burner setup
- best air/fuel ratio. Repeatability and precision of set adjustments
- Modbus communication
- multilevel password
- settings via PC
- adjustable prepurging time (according to the relevant Standards)
- continuous ventilation
- post purging (adjustable time)
- proving system settable to on and off
- adjustable proving system time for all the valve volumes
- load controller settable to on and off
- thermal shock protection function settable to on and off (for cold starts)
- continuous operation

Note: the picture above shows a complete control system.

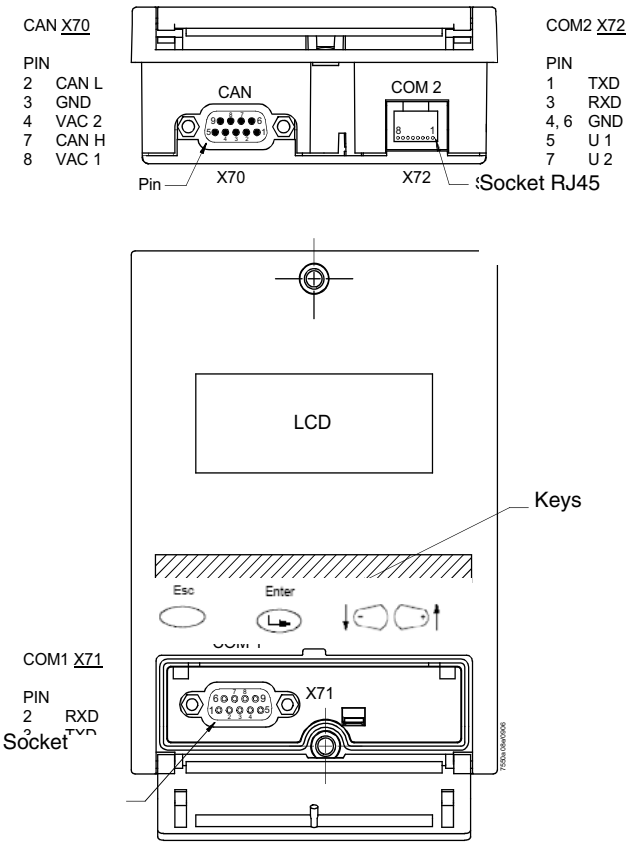
AZL display/programming unit

Users can set only the LMV parameters that can be accessed without password: (see “Adjusting the temperature set-point”). The Siemens AZL User Interface allows programming the Siemens LMV control box and monitoring the system data.



The user interface is made of:

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



AZL5x provides three sockets to interface with other devices:

- X70 socket for CAN bus connection: it provides power supply to display also.
- COM1 (X71) for connection to PC/laptop by RS232 connector
- CMO2 (X72) for connection to building automation system by RJ45 connector.

Note: COM1 and COM2 ports do not work at the same time.

⚠	***Caution: when MODBUS in active, it is not possible to execute the backup via ACS450; if backup is executed the setpoin will be missing and the burner will immediately turns off.***

LMV5 program operating phases

The AZL user interface, shows the program operating phases in the following order
HOME RUN (Phase 10)
STAND BY (Phase 12)
STARTUP I (Phases 20, 21) **Waiting for Start Realase**
STARTUP II (Phase 22) **Start Fan on**
STARTUP III (Phase 24) **Driving to Pre-purging**
STARTUP IV (Phases 30 ... 34) **Pre-purging**
STARTUP V (Phase 36) **Driving to Ignition Pos**
STARTUP VI (Phase 38) **Ignition Pos**
STARTUP VII (Phases 40, 42, 44) **Fuel Release1**
STARTUP VIII (Phases 50, 52) **Fuel Release2**
STARTUP IX (Phase 54) **Driving to Low-fire**
OPERATION I (Phase 60)
OPERATION II (Phase 62) **Shut-down Low-fire**
SHUTDOWN (Phase 70)
SHUTDOWN (Phase 72) **Driving to Postpurge**
SHUTDOWN (Phases 74...78) **Postpurging**
SHUTDOWN (Phase 79) **Test Air PressSwitch**
VALVE PROVING (Phases 80 ... 83)
SAFETY PHASE (Phase 01)
LOCKOUT (Phase 00)

At burner startup, the AZL display will show the various phases of the startup program one by one, until it reaches normal operation phase (Phase 60).

LMV5x controller is factory set. By closing the thermostatic series and once the startup sequence is accomplished (from pahse 12 to pahse34), the burner is driven to the factory-set ignition position (pahse 38).

Then the fuel/air ratio curve must be set, until the maximum load limit (100% output). During the setting, the actuators move to position according to the curve points set. While the actuators move, always check the combustion analisys, point by point, and the fklame stability. In this phase, some temporary points can be set and cancelled successively. Once the requested output is reached, the curve could be optimised according to the flue gas analisys.

It is recommended to check the gas flow rate on each curve point in order that it corresponds to the actual burner output at that point.

Once all the curvepoints are set, LMV will set the points according to the output increasing order.

Example: if Point4 is set at 50% load and Point5 at 40% load, LMV will automatically assign Point4 to 40% and Point5 to 50%.

	CAUTION! The procedure requires a password: qualified personnel only must check all changes to combustion parameters by means of the combustion analyser. Remember that the password will elapse if no key is pressed for a certain period. The unit will ask for the password again.

LMV5 PROGRAM STRUCTURE

OperationalStat	NormalOperation		
	Status/Reset		
	FaultHistory		
	LockoutHistory		
	Alarm act/deact		
Operation	BoilerSetpoint	• SetpointW1 • SetpointW2	
	UserMaxload		
	Fuel		
	Date/TimeOfDay		
	HoursRun		
	StartCounter		
	Fuel Meter		
	LockoutCounter		
	O2 Module		
	BurnerID		
	OptgModeSelect		
	OptgModeSelect		
ManualOperation	SetLoad		
	Autom/Manual/Off		
Params & Display	BurnerControl	• Times • Configuration • ValveProving • ProductID • SW Version	
	RatioControl	• GasSettings • OilSettings • Au-tom/Manual/Off • Times • NumFuelActuators • ShutdownBehav • ProgramStop	
	O2Contr/Guard	• GasSettings • OilSettings • Process Data	
	LoadController	• Controller-Param • TempLimiter • ColdStart • Configuration • Adaption • SW Version	
	AZL	• Times • Language • DateFormat • PhysicalUnits • eBUS • Modbus • Display Contrast • ProductID • SW Version	
	Actuators	• Addressing • DirectionRot • ProductID • SW Version	

Params & Display	VSD Module	• Configuration • Process Data • ProductID • SW Version	
	O2 Module	• Configuration • Displayed Values • ProductID • SW Version	
	Flue Gas Recirc	•	
	SystemConfig	• LC_OptgModeРежим с PM • Ext Inp X62 U/I • TempLimiter • O2Ctrl/LimitrGas • O2Ctrl/LimitrOil • LC Analog Output • Max.Perm.PotDiff	
	HoursRun		
	StartCounter		
	Fuel Meter		
Updating	Password		
	BurnerID		
	ParamBackup		
	Load_SW_from_ PC		
PW Login			
PW Logout			
SafetyCheck-Funct			

ACCESS TO SERVICE LEVELS BY PASSWORD

1 From the main page

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

Esc Esc enter the main menu by pressing the ESC key twice: the display will show

OperationalStat
Operation
ManualOperation
Params & Display.

2 by means of the arrow keys, select “Params&Display”, press ENTER: the system will ask you to enter the proper password, if it has not been entered yet:

Access w-out PW
Access Serv
Accesso con OEMAccess OEM
Accesso con LSAccess LS

3 by means of the arrow keys, select “AccessService” (service level), confirm by pressing ENTER.

4 insert the Service Level password that is “9876” (defualt value);.

5 To insert a character (number or letter) press the arrow keys until the desired character is reached, then press ENTER to confirm and get the next character (the character entered will not be displayed once confirmed by ENTER).

****

6 Repeat the procedure until the password is completed

7 Confirm the password by pressing ENTER again

8 The display will show

BurnerControl
RatioControl
O2Contr/Guard
LoadController

The access to the 6 menues of the “Service” level is gained.

Attention: the display shows 4 rows at a time, to scroll all the rows use keys . To enter the submenu/parameter shown on the row press **“ Enter “** , to go back press **“Esc”** **.**

To go back to the main menu, press “Esc” until the first level menu is reached, then press the “right arrow” , until the first item is reached, then press “ Enter “ twice.

Password Logout

To avoid customer changes on parameter settings and consequently changes in regulation, the password must be logged out. The

"password logout" function os on the first level menu: press ↓ to choose "PW Logout" then press "**Enter**" ↵.

1st level	2nd level	3rd level	4th level	5th level	6th level	Password	Description
OperationalStat ↓							
Operation ↓							
ManualOperation ↓							
Params & Display ↓							
Updating ↓							
PW Login ↓							
PW Logout ↵						Service	Canceling the last access right obtained via password

Note: if no key is pressed within a settable perdiod, the password is deactivated automatically.

Note: if a power supply drop occurs to the unit, the password will be automatically deactivated.

CHANGING THE PASSWORD

1st level	2nd level	3rd level	4th level	5th level	6th level	Pas-sword	Descrip-tion
Updating							
↵	Pas-sword						
	↵	ServicePass-word				Service	3...8 cha-racters

1 Choose "Updating" on the first level menu and press "Enter".
2 choose "Password" and press "Enter": the unit asks to enter the new password;
3 press "Enter" to confirm;
4 the unit asks to enter the new password again to confirm;
5 press "Enter" to store the new password.

Attention: to perform interventions rapidly in case of necessity, it is recommended not to change the factory-set Service password.

BURNER ID NUMBER

The burner ID number corresponds to the **burner serial number**.

Note: in case of call to the Service Center, always tell the burner type and serial number.

1 Press " Esc " Esc twice: the fist level menu will be shown
2 by means of ↓ ↑, choose "Operation";
3 press "Enter" ↵ to go to the second level and choose "BurnerID";
4 press "Enter" ↵ to see the data.

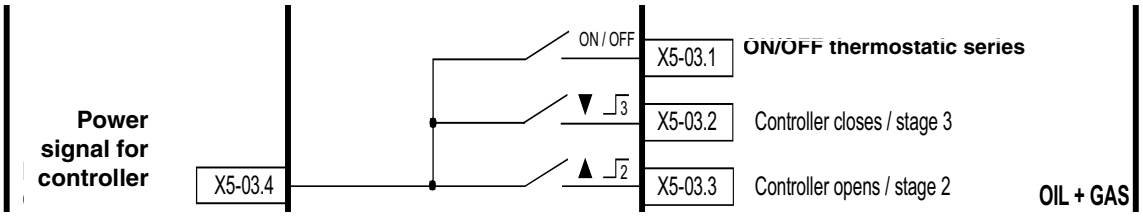
1st level	2nd level	3rd level	4th level	5th level	6th level	Pas-sword	Descrip-tion
Operatio-nalStat							
	BurnerID					User	Identifica-tion of burner

the product ID number is an OEM parameter, entered by the burner manifacturer and it can not be changed; it can be made of minimum 4 characters and maximum 15.

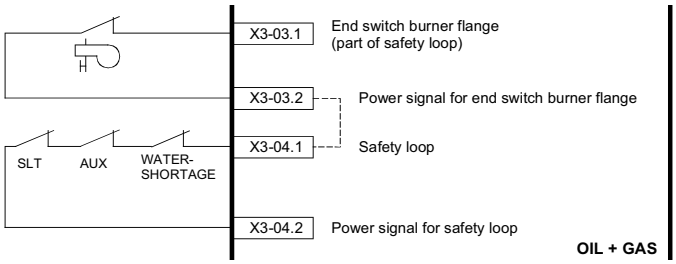
To go back to the main page, press “Esc” until the first level menu is reached, then press the “right arrow” , to choose the first row, then press “Enter“ twice.

BURNER STARTUP/SHUTDOWN BY MEANS OF THE THERMOSTATIC SERIES

The burner shuts down properly when the 1 and 4 terminals of the thermostatic series (X5-03.1 and X5-03.4 - terminals 3 and 4 of the burner terminal block) open. In this way, before shtudown, the burner drives to the minimum load, then the fuel valve will close. The post-purging phase will be performed if set. By re-closing the thermostatic series, the burner will startup again.



In the plant the safety thermostat is provided as well. If this thermostat switches (terminals X3-04.1 e X3-04.2 corresponding to terminals 318 and 319 of the burner supply terminal block - see below), the system will lead to an immediate burner lockout.



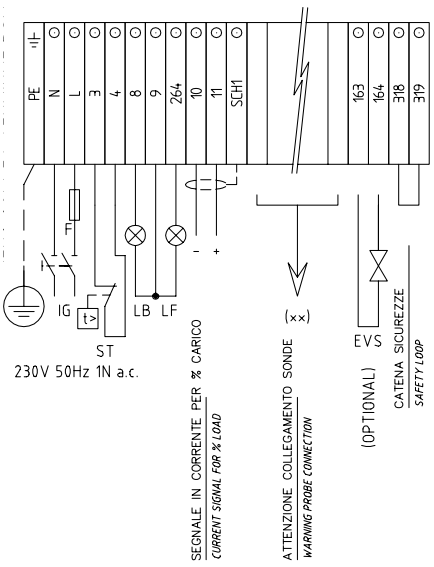
SLT: safety loop thermostat

AUX: ausiliary contact

Water Shortage: water flow switch

In case of burner designed with automatic pull-out system from the generator, the burner flange end switch is connected to terminals X3-03.1 e X3-03.2. If the contact opens, the burner automatically shuts down.

Burner supply terminal block:



The maximum number of emergency shtudowns is 16. When this number is reached a lockout will occur.AZL will show the message: “Open safety loop”.

This number can be changed and set to a value between 1 and 16, following the next procedure:

1st level	2nd level	3rd level	4th level	5th level	Range	Default	Description
Params & Display							Menu level for making the parameter settings
	BurnerCon-trol						Setting the burner con-trol parameters
		Configuration					
			RepetitCoun-ter				It sets the maximum number of possible repetitions
				SafetyLoop	1 - 16	16	

ADDRESSING THE ACTUATORS

The addressing assigns to each actuator its proper function.The addressing is factory set by the burner manifacturer.

If an actuator must be replaced, it is necessary to address it, otherwise the system will not work. The parameter that sets the acutator function is protected by the Service level password. Remeber to check that the jumper “Bus termination” of the last actuator on the CAN bus is set to “On”, before starting addressing.

1st level	2nd level	3rd level	4th level	5th level	6th level	Password	Description
Params & Display							
	Actuators						
		Addres-sing					Addressing unad-dressed actuators
			1. AirActuator 2. GasActuat (Oil) 3. OilActuator 4. AuxActuator 1 5. AuxActuator 2 6. AuxActuator 3			Service	

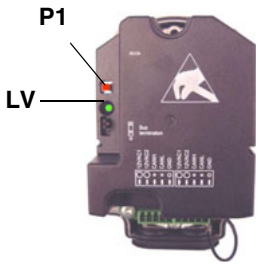
To address an actuator, choose the corresponding actuator and follow the instructions on display:

When the actuator green LED flashes, it means that one of the following function is set according to the number of blinks:

Blinks	Actuator function
1 blink	air damper actuator
2 blinks	gas butterfly valve actuator
3 blinks	oil pressure governor actuator
4 blinks	auxiliary actuator
5 blinks	auxiliary actuator
6 blinks	auxiliary actuator

CAUTION: it is recommended not to adjust the actuators. Anyway, never press the actuator red button, otherwise the fundamental parameters, necessary for the burner operation, will be cancelled. The burner will therefore continuously lock out.

In case P1 was accidentally pressed for a long time, it will be necessary to perform a new addressing of the actuator.



Note: when the actuator LV green LED is always lit, it means that the actuator has not been addressed yet or it has been reset and needs to be addressed again.

STANDARDIZATION OF THE MOTOR SPEED

Motor standardization (speed acquisition) allows the LMV unit to control the motor rounds at the maximum frequency signal coming from the VSD. A temporary standardization is factory set only for test purpose. The definite standardization mest be perormed on site by the Service Center, before the plant test.

To perform standardization, the burner must be in stand-by mode, not it lockout stage. The Safety loop must be closed (X3-04).

1st level	2nd level	3rd level	4th level	5th level	Range	Description
Params & Display						Menu level for making the parameter settings
	VSD Module					Settings for the VSD module
		Configuration				
			Speed			
				Standardiza-tion	deactivated/acti-vated	Standardization pro-cess for fan speed

By activating the standardization, without starting the burner up, the air actuator drives to ites maximum opening. The fan motor stars and the VSD drives the motor to its maximum speed. The speed sensor, mounted on the motor, detects the rpm value. LMV stores the data and the motor stops.

Attention: do not enter manually the rpm value of the motor data plate on parameter “StandardizedSp”.

ATTENTION: the power cable that connects VSD to motor must be screened.

SETTING THE ACTUATOR SPEED

LMV sees VSD as an actuator, that’s why the speed ramp up and the stop times must not be higher than the actuator stroke time. If it is necessary to increase the VSD times, change the actuator stroke time also, according to the next procedure. By following the next table, set both parameter “OperatRampMod” and “TimeNoFlame” to set the ramp up/stop times for the VSD and the actuator opening speed (from 0° to 90°).

1st level	2nd level	3rd level	4th level	Password	Range	Defa ult	Description
Params & Display							Menu level for making the parameter settings
	RatioCon-trol						Parameter settings for fuel/ air ratio control
		Times					
			OperatRam-pMod	Service	10...60 s	40s	Duration operating ramp fuel / air ratio control modulating operation
			TimeNo-Flame	Service	10...120 s	40s	Duration ramp in pre-purge and ignition posi-tion

SETTING THE LOAD CONTROLLER

1st level	2nd level	3rd level	4th level	5th level	6th level	Password	Description
Params & Display							Menu level for making the parameter settings
	LoadController						Settings for the internal load controller
		Configuration					General configuration of the load controller
			LC_OptgMode			User	Operating mode with load controller
				ExtLC X5-03 Int LC Int LC Bus Int LC X62 Ext LC X62 Ext LC Bus		User	

It is possible to choose the type of load controller: the LMV internal controller, an external one, the LMV internal load controller but with an external control etc..:

ExtLC X5-03 = three-point external controller (X5-03 terminals)

Int LC = internal controller (LMV5x)

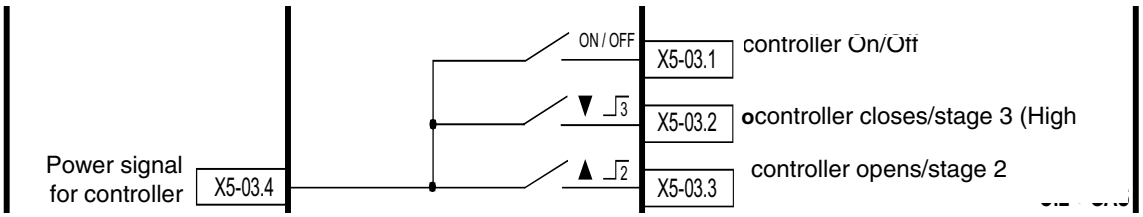
Int LC Bus = internal controller and supervision via bus connection

Int LC X62 = internal controller (LMV), but set point is externally controlled by means of a voltage/current signal on X62 terminals

Ext LC X62 = external controller, the burner output is controlled by means of a voltage/current signal on X62 terminals

Ext LC Bus = external controller, the burner output is controlled via bus

- **Wiring diagram for three-point external load controller on X05-3 terminals**



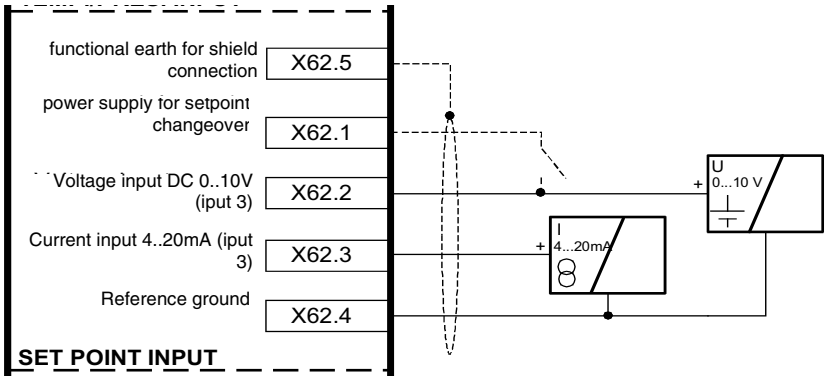
X5-03.4 = power signal for controller

X5-03.1 = controller On/Off

X5-03.2 = controller closes/stage 3 (High flame)

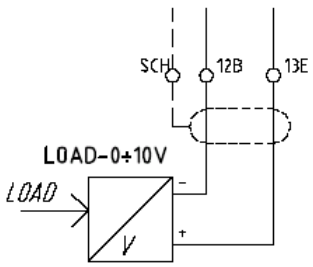
X5-03.3 = controller opens/stage 2 (Low flame)

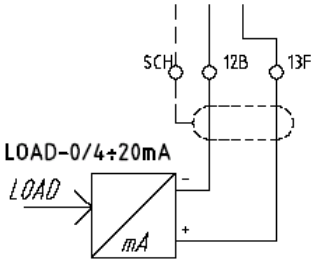
- **Wiring diagram for external load controller by voltage/current signal on X62 terminals**



X62.5 = functional earth for shield connection
X62.1 = power supply for setpoint changeover
X62.2 = Voltage input DC 0..10V (iput 3)
X62.3 = Current input 4..20mA (iput 3)
X62.4 = Reference ground

- **Wiring diagram for external load controller by voltage/current signal on burner terminal block**





If the set-point is to be changed extrernally or load is to be controlled externally by means fo a signal on terminals X62, choose the signal as follows:

1st level	2nd level	3rd level	4th level	5th level	6th level	Password	Description
Params & Display							Menu level for making the parameter settings
	LoadController						Settings for the internal load controller
		Configuration					General configuration of the load controller
			Ext Inp X62 U/I			Service	Configuration of external input X62: input signal on X62 can change setpoint or control the load
				4...20 mA 2...10 V 0…10 V 0…20 mA			

SETTING THE TEMPERATURE OR PRESSURE PROBE

If the LMV5x internal load controlled is used, a temperature or pressure probe can be connected pt terminal X60 or X61. In this case, it is necessary to set the kind of probe and its operating range.

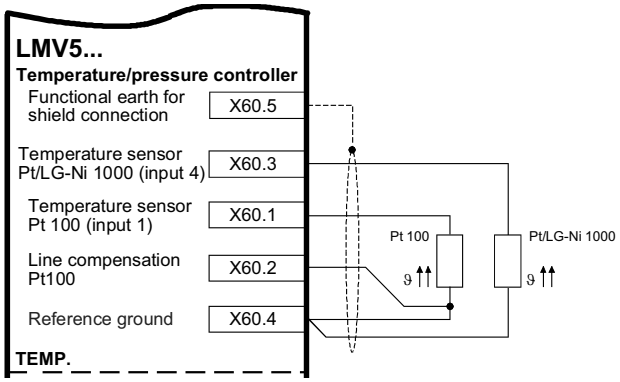
1st level	2nd level	3rd level	4th level	5th level	6th level	Pas-sword	Descrip-tion
Params & Display							Menu level for making the para-meter set-tings
	LoadCon-troller						Settings for the internal load con-troller
		Configura-tion					General configura-tion of the load con-troller
			Sensor Select				Select actual value input
						Service	Pt100 Pt1000 Ni1000 Temp sen-sor Press sen-sor Pt100Pt10 00 Pt100Ni10 00 NoSen-sor

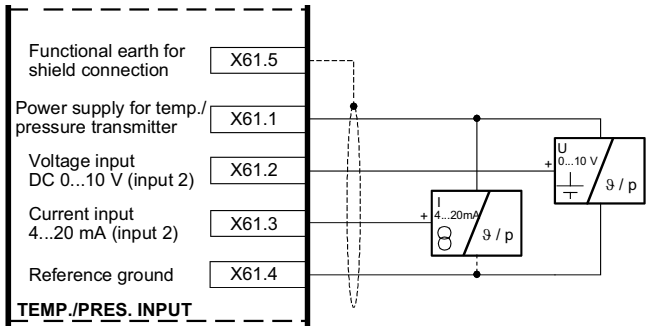
Note: if the external load controller is set, it uses its own independent probe, not connected to terminals X60. If a boiler second probe is to be connected to terminals (1000ohm only), internal functions TL_ThreshOff and DiffIntervTL_SD_On are activated automatically (see next paragraph “Setting TL_ThreshOff and TL_SD_On”). These funciotns enable the settable threshold for the immediate shu-tdown, if value set on TL_ThreshOff is exceeded. The automatic restart is perfomed for values lower than the one set onI TL_SD_On. On display, values detected by temperature/pressure probe are shown contemporarly.

Possible settings are:

Probe	Description
Pt100	Only modulation
Pt1000	Modulation and temperature limiter active TL_thresh.Off
Ni1000	Modulation and temperature limiter active TL_thresh.Off
Temperature probe	Only modulation
Pressure probe	Only modulation
Pt100 + Pt1000	Modulation + temperature limiter TL_thresh.Off
Pt100 + Ni1000	Modulation + temperature limiter TL_thresh.Off
No probe connected	Only External modulation

Connecting 100 ohm / 1000 ohm temperature probes directly to LMV terminals	Connecting 0...10V / 4...20 mA / 0...20 mA pressure probes directly to LMV terminals

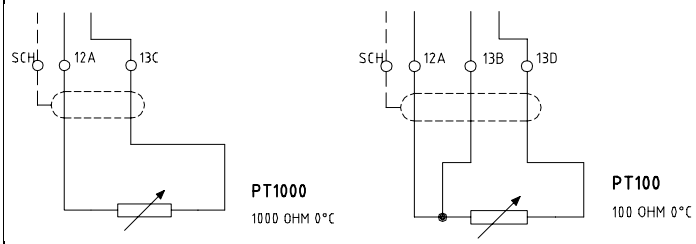


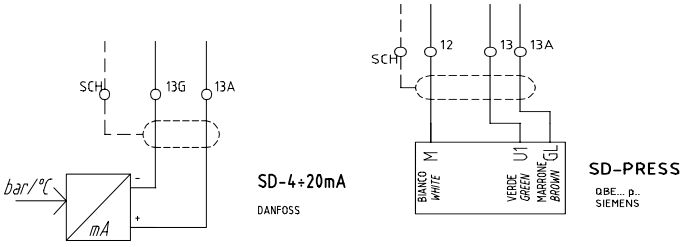


Temperature probes on burner control panel		
Terminals		Description
LMV	Burner	
X60.5	SCH	Functional earth for shield connection
X60.3	13C	Temperature probe 1000 Ω
X60.1	13D	Temperature probe 100 Ω
X60.2	13B	Compensation line
X60.4	12A	Reference ground

Pressure probes on burner control panel		
Terminals		Description
LMV	Burner	
X61.5	SCH	Probe cable screen
X61.1	13A	Power aupply for temp./pressure probe
X61.2	13	Voltahe input (0..10Volt)
X61.3	13G	Current input (0/4..20mA)
X61.4	12	Reference ground

Connecting 100 ohm / 1000 ohm temperature sensors to burner teminals	Connecting 0...10V / 4...20 mA / 0...20 mA pressure sensors to burner teminals





Note: Siemens QBE2...P pressure probes send a 0-10 Volt output signal, while Danfoss MBS3200... pressure probes send a 4-20 mA output signal.

If a pressure probe is used, set its output signal type sent to X61 input, proceeding as follows:

1st level	2nd level	3rd level	4th level	5th level	6th level	Pas-sword	Descrip-tion
Params & Display							Menu level for making the para-meter set-tings
	LoadCon-troller						Settings for the internal load con-troller
		Configura-tion					General configura-tion of the load con-troller
			Ext Inp X61 U/ I				Configura-tion of external input X61Config urazione ingresso X61
						Service	4…20 mA 2...10 V 0...10 V 0…20 mA

Once the pressure sensor signal type is set, the sensor range must be set as well, proceeding as follows:

1st level	2nd level	3rd level	4th level	5th level	6th level	Pas-sword	Description
Params & Display							Menu level for making the parame-ter settings
	LoadCon-troller						Settings for the inter-nal load controller
		Configura-tion					General configura-tion of the load con-troller
			MRange Press-Sens				End of pressure measuring range for input X61
						Service	0...99.9 ba

Example: if a max 10bar Siemens sensor is used, the voltage output signal will be 0Volt at 0bar, while the 10Volt signal will correspond to its maximum pressure 10bar. If the sensore is replaced with a max 16bar one, the 0V output signal will correspond to 0bar, while the 10V output signal will correspond to 16bar pressure: the parameter “MRange Press-Sens” has to be set at 16bar.

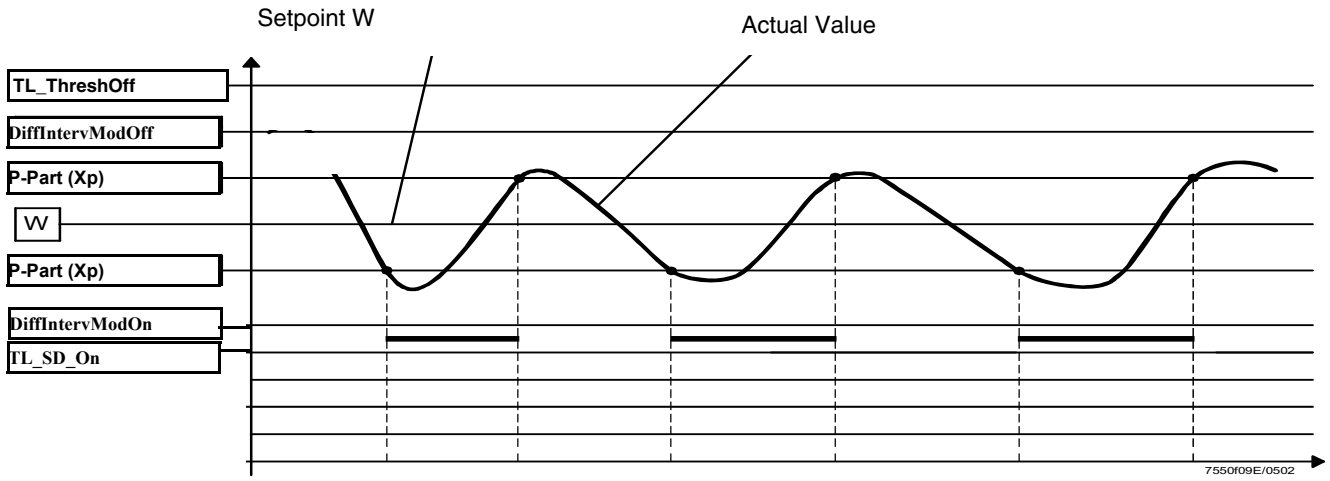
SETTING FUNCTIONS “TL_ThreshOff” AND “TL_SD_On”

Note: this function is available if a Ni1000 or Pt 1000 temperature sensor is connected to X60.3 and X60.4 terminals.

- **TL_ThreshOff:** it turns the burner off if temperature exceeds the set value.
- **TL_SD_On:** it automatically restart the burner up of temperature is lower than the set value.

ATTENTION: basically, these parameters provide a function similar to the safety thermostat one, but can not replace it. The boiler must **always** operate with its safety thermostat connected properly.

ATTENTION: the parameter TL_ThreshOff for the immediate shutdown, must always be set to a value higher than the SD_ModOff threshold for the normal shutdown (see chapter Setting functions “TL_ThreshOff” and “SD_ModOn”).



1st level	2nd level	3rd level	4th level	Range	Pas-sword	Default	Descrip-tion
Params & Display							Menu level for making the para-meter set-tings
	LoadCon-troller						Settings for the internal load con-troller
		TempLimiter					Settings for the tempe-rature limi-ter function
			TL_ThreshOff	0...2000 °C	Service	95°C	Tempera-ture limiter OFF thre-shold, in °C
			TL_SD_On	-50...0% TL_Thres h_Off	Service	- 5%	Tempera-ture limiter switching differential ON

SETTING THE TEMPERATURE SET-POINT VALUE

Note: the set-point parameter is user settable.

To set the temperature set-point value, that is the generator operating temperature; proceed as follows. From the main page, enter the main menu by pressing the ESC key twice:

OperationalStat
Operation
ManualOperation
Params & Display.

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

Access w-out PW
Access Serv
Accesso con OEMAccess OEM
Accesso con LSAccess LS

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

BurnerControl
RatioControl
O2Contr/Guard
LoadController

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

ControllerParam
Configuration
Adaption
SW Version

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

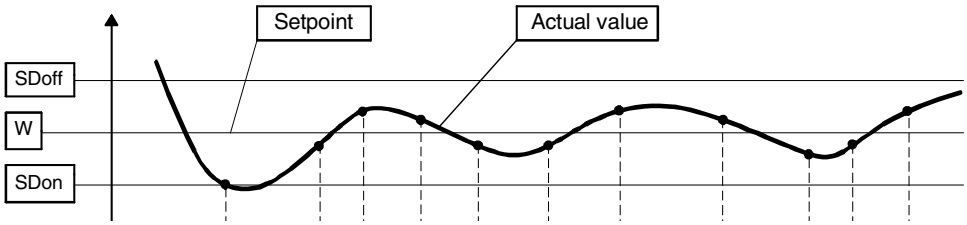
ContrlParamList
MinActuatorStep
SW_FilterTmeCon
SetPointW1

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

SetPointW1
Curr: 90°
New: 90°

Curr: it shows the current set-point; use the arrows keys to change it.
NOTE: the available range depends on the probe used; the measure unit of the detected data and its relevant limits are set by “Service” level parameters. Once the new set-point is set, confirm by pressing ENTER, otherwise exit without changings by pressing ESC.
Press ESC to exit the set-point programming mode, afeter pressing ENTER to confirm the data prompted.

Once the temperature set-point W1 is stored, set the Switch-on (SDon) and the Switch-off (SDoff) point:



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

SetPointW1
SetPointW2
SD_ModOn
SD_ModOff

the display will show:

SD_ModOn
Curr: 1.0%
New: 1.0%

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

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

SetPointW1
SetPointW2
SD_ModOn
SD_ModOff

the display will show:

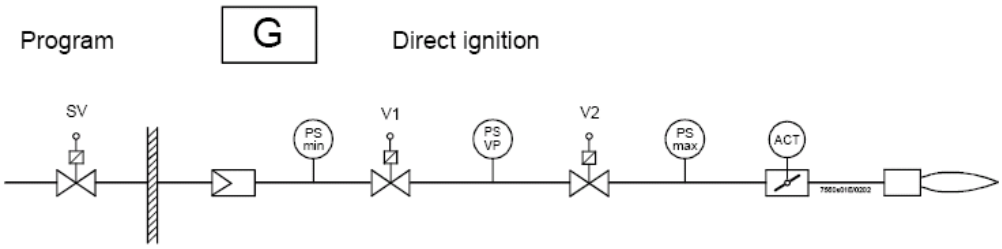
SD_ModOff
Curr: 10.0%
New: 10.0%

The deafult value for this parameter is10% that is, the burner will turn off at a temperature 1% higher than the set-point.
Press the ENTER to confirm, the press ESC to exit. Otherwise press ESC to exit without changing data.
Press the ESC key until the following menu is shown:

BurnerControl
RatioControl
O2Contr/Guard
LoadController

IGNITION POINT

Gas burner with "G" type direct ignition, with no ignitor



SV = Safety valve
V1 = Valve 1
V2 = Valve 2 & gas governor
ACT = Gas actuator

The ignition point is independent from the other curvepoints of the air/fuel ratio curve.
As far as dual fuel burners, the ignition point set for the gas operation does not depend on the one set for the oil operation.

The burner is provided with a factory-set ignition point, to make easier the first ignition procedure by the Service Centre.
The air actuator at the ignition point, is factory set at a 6°/7° opening, while the gas actuator is set at 12°/15°. In case of burner provided with VSD, it is suggested to set ignition at 100% VSD frequency.
The primary target for the regulation is to set the actual operating pressure for the gas governor (V2 in the scheme) at the maximum flow rate. All the adjustments depend on this pressure value, the ignition point adjustment as well.
TO change the actuator positions on the ignition point, proceed as follows.

Changing the actuator position on the gas ignition points

1st level	2nd level	3rd level	4th level	5th level	6th level	Pas-sword	Descrip-tion
Params & Display							Menu level for making the para-meter set-tings
↵	RatioControl						
	↵	GasSettings					
		↵	Special Positions				
			↵	IgnitionPos			
				↵	IgnitionPosGas	Service	
				↵	IgnitionPosAir	Service	
				↵	IgnitionPosAux 1	Service	
				↵	IgnitionPosAux 2	Service	
				↵	IgnitionPosAux 3	Service	
				↵	IgnitionPosVSD	Service	

Example:
IgnitionPosGas: 12°; IgnitionPosAir: 6,7°; IgnitionPosVSD: 100% frequency

⚠	**CAUTION**! If no flame is detected atignition stage, proceed as follows: ● check the gas pipeline was properly bled ● increase setp by step (max 2° per step) the gas actuator opening at ignition position ● it is recommended not to exceed 20° opening.

Other reason for ignition missing can be due to the following causes:

- electrodes ceramic insulator broken
- electrode ignition cable disconnection, while removing/mounting the blast tube
- ignition cable damaged
- faulty ignition transformer
- faulty fuel valve
- excess of combustion air at the ignition point (i.e., in case of very high depressure in the combustion chamber)

If flame does not appera within the safety time “SafetyTme1Gas/Oil”, or it appears but it is not detected by the flame detector, the burner locks out and the following message is displayed:

”NO FLAME AT END OF SAFETY TIME”

alternatively code number **C:25** and diagnostic number **D** appear:

C: 25 D:----

If burner does not start up the message will be:

”FAULT POSITIONING ACTUATOR”

alternatively code number **C:15**, and diagnostic code **D** appear:

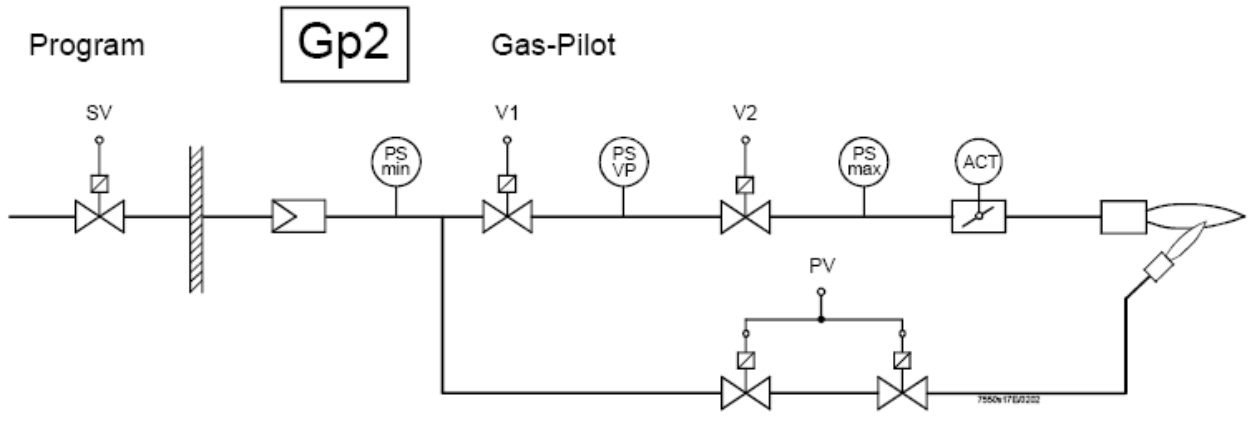
C: 15 D:----

it means that there is a faulty actuator and its number is represented by the diagnostic code **D**.

C:15 D 01 = Air actuator position not reached
C:15 D 02 = Fuel actuator position not reached
C:15 D 04 = Aux1 actuator position not reached
C:15 D 08 = Aux2 actuator position not reached
C:15 D 10 = Fan speed not reached
C:15 D 20 = Aux3 actuator position not reached

ATTENTION: in these cases the actuator must be replaced and addressed (see paragraph “Addressing the actuators”).

Gas burners with pilot “Gp2”



SV = Safety valve
V1 = Valve 1
V2 = Valve 2 & gas governor
ACT = Gas actuator
PV = Pilot Valve

The burner is provided with factory-set ignition point. The pilot (PV) gas valves are adjusted completely open and the pilot pressure governor (PV) is set to values that allow easy operation for the Service Centre at first ignition.

If the pilot flame does not appear within the first safety time, The V1 and V2 main valves will not open and the "Flame lockout" will occur.

The gas actuator (ACT) is not involved during pilot ignition, anyway it is set on average values to easily pass from pilot flame to main gas valves low flame. The air actuator is set on average value as weel, in order to make the Service Centre perform the first ignition easily.

If factory setting is not sufficient, it is possible to change both the governor output pressure of the pilot valve (PV) and the air actuator angle at ignition point, following the procedure on previous paragraph.

ADJUSTING THE AIR/FUEL RATIO CURVES



Attention: when burners are provided with **VSD**, before setting the air/fuel ratio curves, the **Standardization** of the motor speed must be performed (see chapter "Standardization").

1 From the main page

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

enter the main menu by pressing the ESC key twice: the display will show

OperationalStat
Operation
ManualOperation
Params & Display.

2 by means of the arrow keys, select "Params&Display", press ENTER: the system will ask you to enter the proper password, if it has not been entered yet:

Access w-out PW
Access Serv
Accesso con OEMAccess OEM
Accesso con LSAccess LS

3 by means of the arrow keys, select "AccessService" (service level), confirm by pressing ENTER.

4 insert the Service Level password that is "9876" (defualt value);.

5 To insert a character (number or letter) press the arrow keys until the desired character is reached, then press ENTER to confirm and get the next character (the character entered will not be displayed once confirmed by ENTER).

****

6 Repeat the procedure until the password is completed

7 Confirm the password by pressing ENTER again

8 The display will show

BurnerControl
RatioControl
O2Contr/Guard
LoadController

DEAFUL SETTINGS

To make the startup operation easier for the Service Centre, two curvepoints are factory set (default settings):

1 the first point (**P1**) is temporarly named “10% load”: the air and gas actuators opening are set on minimum values;

2 for safety reasons, at the second point (**P2**) the air and gas actuators opening impostati are set on **P1** same minimum values, even if **P2** is temporarly named “100% load”.

Note: points P1 and P2, are temporarly mentioned as 10% and 100% load, independently from the actual load. The operator can name the load on each point, without respecting the actual load value in that point. LMVx will order those points automatically according to the load values set by the operator.

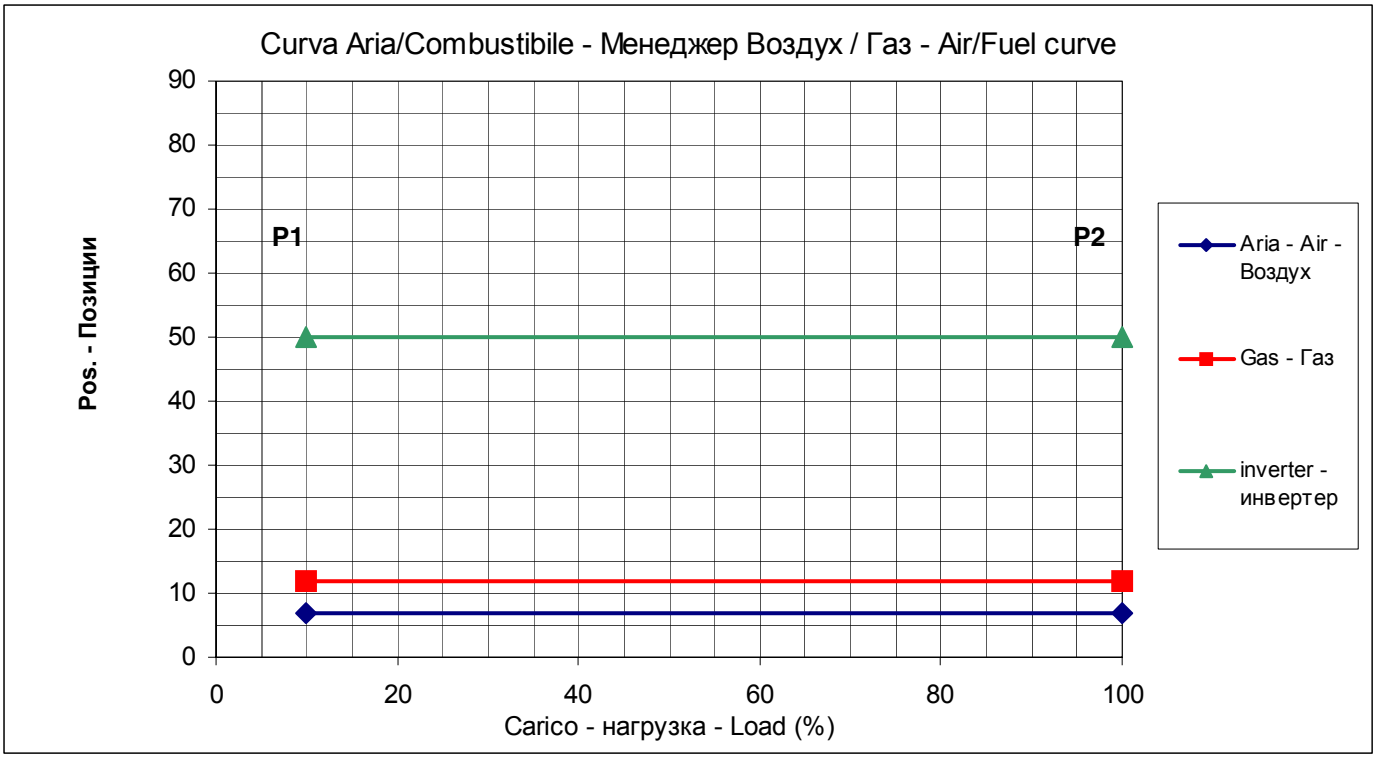


Fig. 1 - Diagram of default curve

With this setting, by closing the thermostat series, the burner drives to minimum load position **P1**, after ignition. Then it drives to the maximum load position **P2** without increasing the output as both the points are set with actuators minimum opening.

Setting the maximum load point for the maximum output

To set the maximum load point **P2** according to the maximum output, proceed as follows:

1 from menu

BurnerControl
RatioControl
O2Contr/Guard
LoadController

follow the procedure shown on the next table, using the designated keys:

1st level	2nd level	3rd level	4th level	Password	Description
Params & Display				Service	
	RatioControl				Parameter settings for fuel/ air ratio control
		Gas settings			Parameter settings for firing on gas
			CurveParams		At this level, the air/fuel ratio during operation is to be set.

2 by means of the arrow keys, select “CurveParams” and confirm by pressing ENTER: the display will show

Point		10
\	Fuel	6.7
	Air	12
Man	VSD	50

Wait until symbol “\” stops twisting.
Press Enter to see Point1.



Point	Load	10
:1	Fuel	12
O2	Air	6.7
	VSD	50

Press “right arrow”  to see Point2.



Point	Load	100
:2	Fuel	12
O2	Air	6.7
	VSD	50

Press Enter to change Point2.



Change
Delete

(Only for LMV52xx) Press Enter to change Point2.



Follow
Not follow

Press Enter on “Follow”



Point	**Load**	**100**
:2	**Fuel**	**12**
O2	**Air**	**6.7**
	Aux1	**xx**
	VSD	**50**

Now it is possible to change Point2 with the next procedure

Checking continuously the excess of air by means of the combustion analyser, increase by few degrees* (see Note below) the air damper opening and the VSD if provided.

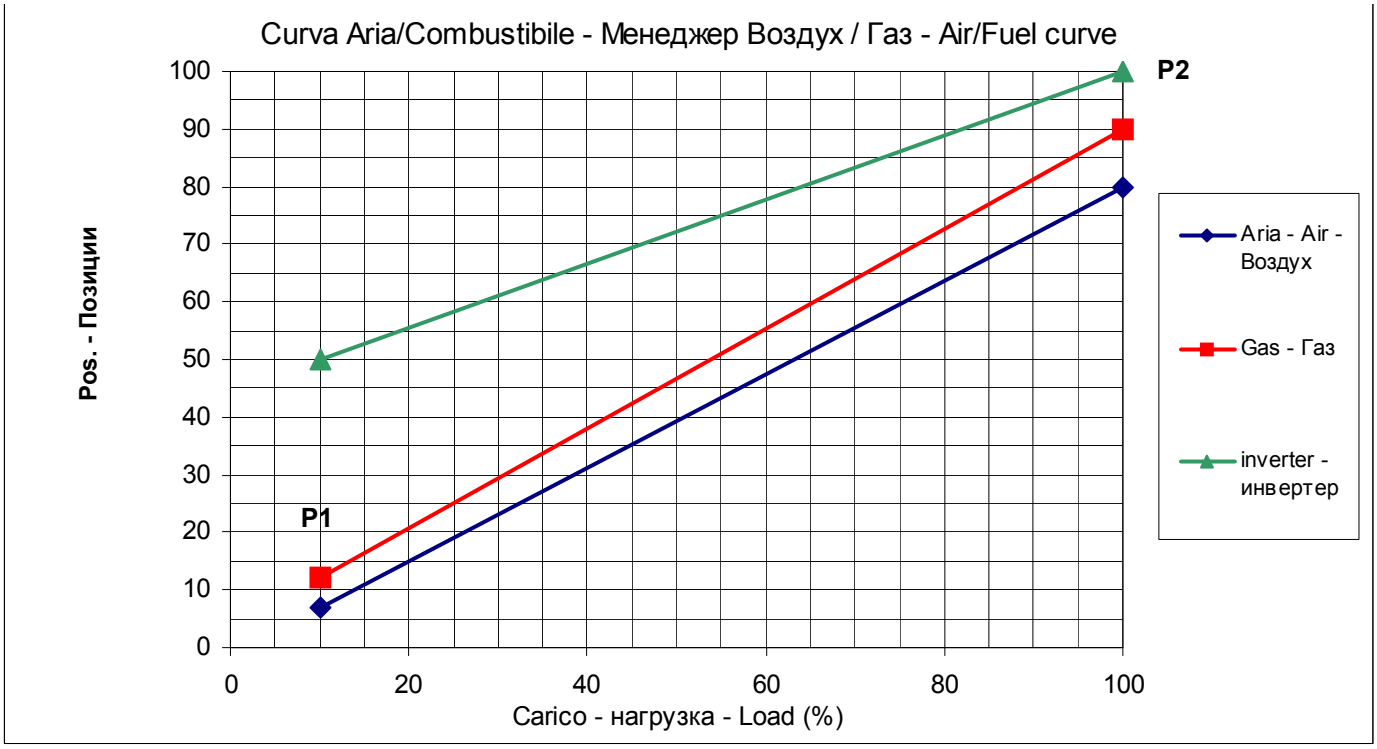
Then increase by few degrees* (see Note below) the gas butterlfy valve as well (or the fuel actuator). Go on step by step, until the butterfly valve complete opening is reached (actuator at 90° - see diagram).

The target is to reach the gas butterlfy valve maximum with a sufficient excess of air. While progressively increasing the actuator positions, besides increasing the air quantity the fuel rate must be controlled by means of the valve pressure governor, in order to not exceed the requested maximum flow rate.

Once the gas butterfly valve maximum opening is reached, adjust the fuel **rate** only acting on the gas valve pressure governor (or on the oil pressure governor incase of oil).

***Note:** as for “increasing by few degrees” it means that the increasing must be perfomed in order to avoid great excess of air or loss of air.

Therefore the increasing operation must be performed always checking the flue gas analisys by means of the combustion analyser. It is recommended to make increasing while mantaining O_2 % between max 7,5% and min 3%.



Once the fuel rate is set by means of the valve group pressure regulator, checking continuously the excess of air by means of the combustion analyser, set the air excess by means of the air actuator and/or VSD. At the end, store the point 2 following the below procedure:

Point	**Load**	**100**
:2	**Fuel**	**12**
O2	**Air**	**6.7**
	VSD	**50**

To choose the actuator to set, press the “left arrow” ↓ and choose Air or VSD

↓

Point	**Load**	**100**
:2	**Fuel**	**12**
O2	**Load**	**6.7**
	VSD	**50**

Press Enter ↵ to access the Air actuator value to be set.

↵

Point	**Load**	**100**
:2	**Fuel**	**12**

Press keys ↓ ↑ to change the value.

O2	Air	
	VSD	50

Press Enter to confirm the value and go back to Air actuator. (Do not exit by pressing Esc from the values column because data will not be stored)

Point	Load	100
:2	Fuel	12
O2	Air	9.5
	VSD	50

Press arrows to select another actuator to be set, for example, press to choose **Fuel**

Point	Load	100
:2	Fuel	12
O2	Air	9.5
	VSD	50

Press Enter to access the value to be changed for Fuel actuator.

Point	Load	100
:2	Fuel	12
O2	Air	9.5
	VSD	50

Press keys to change the value. Press Enter to confirm the value and go back to Fuel actuator

Point	Load	100
:2	Fuel	15
O2	Air	9.5
	VSD	50

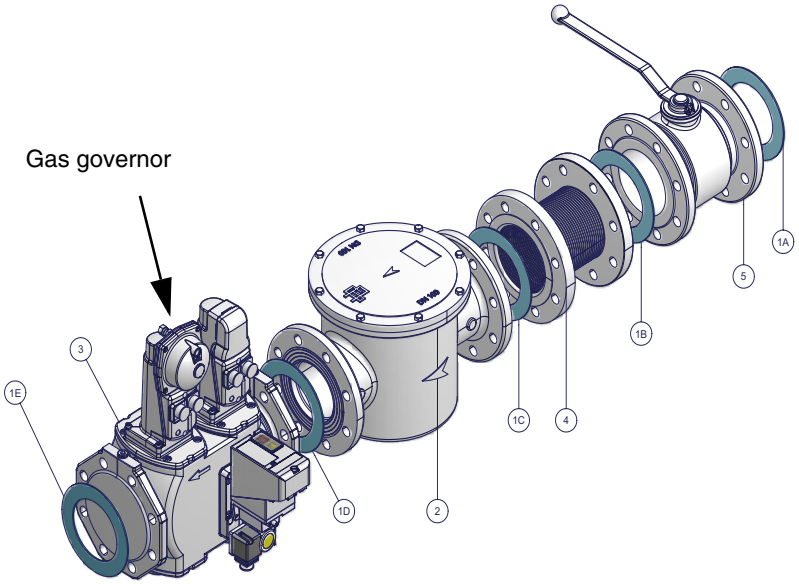
Checking parameters by means of the combustion analyser go on increasing the Air (and/or VSD if provided) and the Fuel actuators until the butterfly gas valve 90° position is reached.

Point	Load	100
:2	Fuel	90
O2	Air	85
	VSD	100

Press Enter to confirm the value and go back to **Fuel. Do not press** Esc from the values column otherwise data will not be stored.

Point	Load	100
:2	Fuel	90
O2	Air	85
	VSD	100

Once the gas butterfly valve maximum opening is reached, adjsut the fuel rate by means of the gas valve pressure governor only (or by the oil pressure goveror if oil burner is provided)..



Once the fuel rate is set by the governor, adjust the excess of air by means of the Air actuator and/or VSD, always checking the combustion values.

Storing the curve point

Point	**Load**	**100**
:2	**Fuel**	**90**
O2	**Air**	**85**
	VSD	**100**

From the actuator column, press Esc to store the point, the display will show:

Esc

Point	
Store	**Enter**
Cancel	**ESC**

Press Enter to confirm the point

Do not exit by means of Esc Esc diretcly from the values column or data will not be stored.

Point	**Load**	**100**
:2	**Fuel**	**90**
O2	**Air**	**85**
	VSD	**100**

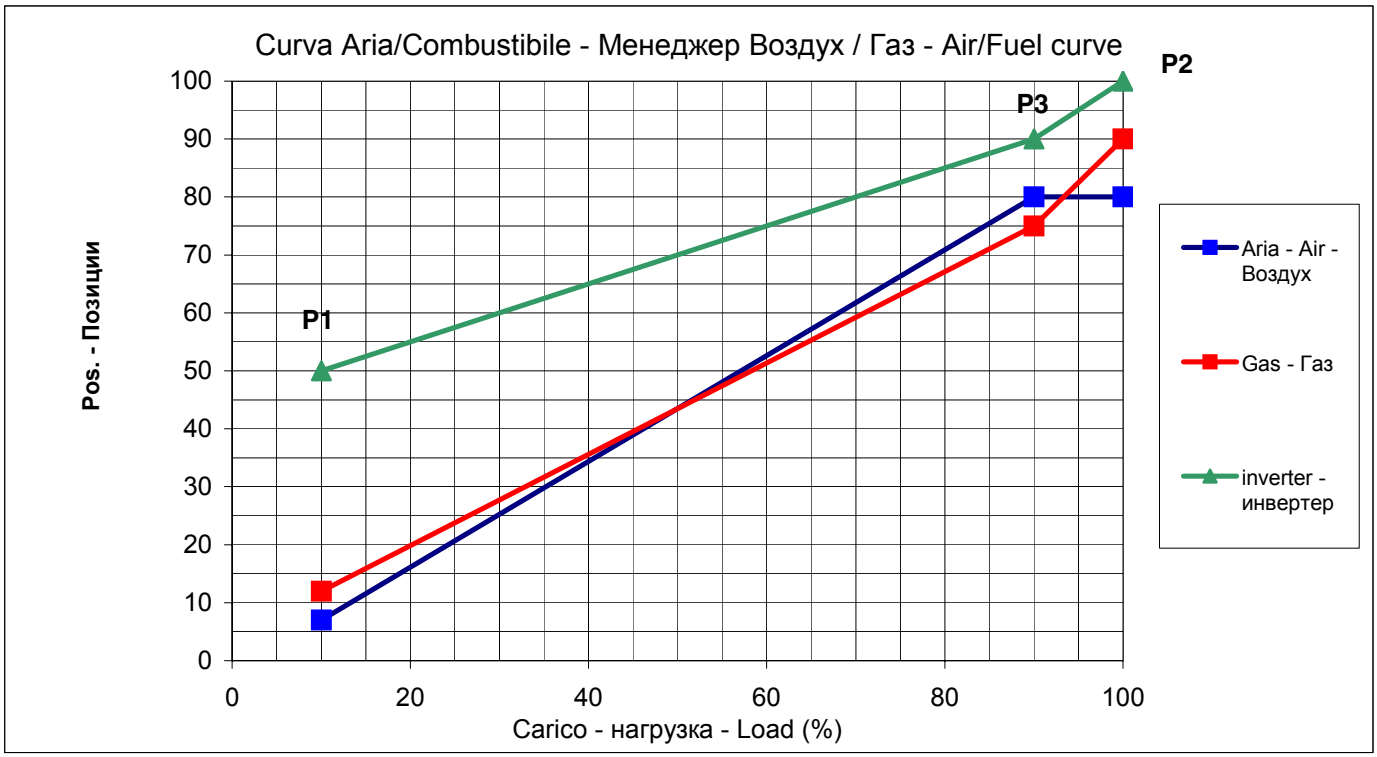
Point2 is then stored.

Caution! For safety reasons, once the maximum load point P2 is set, never go down to the minimum load point P1, without having set the other intermediate points before (see next paragraph).

Caution! In case it is necessary to immediately shut the burner down while working at high flame and the maximum load poitn already set, sht the burner down by means of the main switch. When starting the burner up again, do not go from point P1 to point P2 without setting the intermediate points before.

Caution! In case it is necessary to immediately shut the burner down while working at high flame and the maximum load point is not already set observing the combustion parameters, decrease gas by means of the pressure governor as to dirve the burner to a sufficient excess of air, the shut the burner down by the main switch. At next startup, start again with point P2 to the minimum load (factory-setting - see previous paragraph) and go on setting the curve points.

Setting a new point (P3)



To store a new point, proceed as follows:

Point	**Load**	**100**
:2	**Fuel**	**90**
O2	**Air**	**85**
	VSD	**100**

From the last point saved (P2), press key , the following display will be shown to set the new point (P3).

Point	**Load**	**xxxx**
:3	**Fuel**	**xxxx**
O2	**Air**	**xxxx**
	VSD	**xxxx**

Press Enter to access the new point (P3) to be set: the new point will be shown with the same values of the previous point (P2).

Point	**Load**	**100**
:3	**Fuel**	**90**
O2	**Air**	**85**
	VSD	**100**

Press Enter to change the load on the new point P3.

Then by means of change its value.

Point	**Load**	
:3	**Fuel**	**90**
O2	**Air**	**85**
	VSD	**100**

For example, if the load value at the new point (P3) should be 90 %, by means of it is possible to change the value.

Point	**Load**	
:3	**Fuel**	**90**
O2	**Air**	**85**
	VSD	**100**

Premere Enter perconfermare e tornare nella colonna dei servocomandi.

Point	Load	90
:3	Fuel	90
O2	Air	85
	VSD	100

To choose, for instance, the new actuator **Comb** to be set, use keys ↓ ↑

Point		90
:3	Load	90
O2		85
	VSD	100

Premere Enter

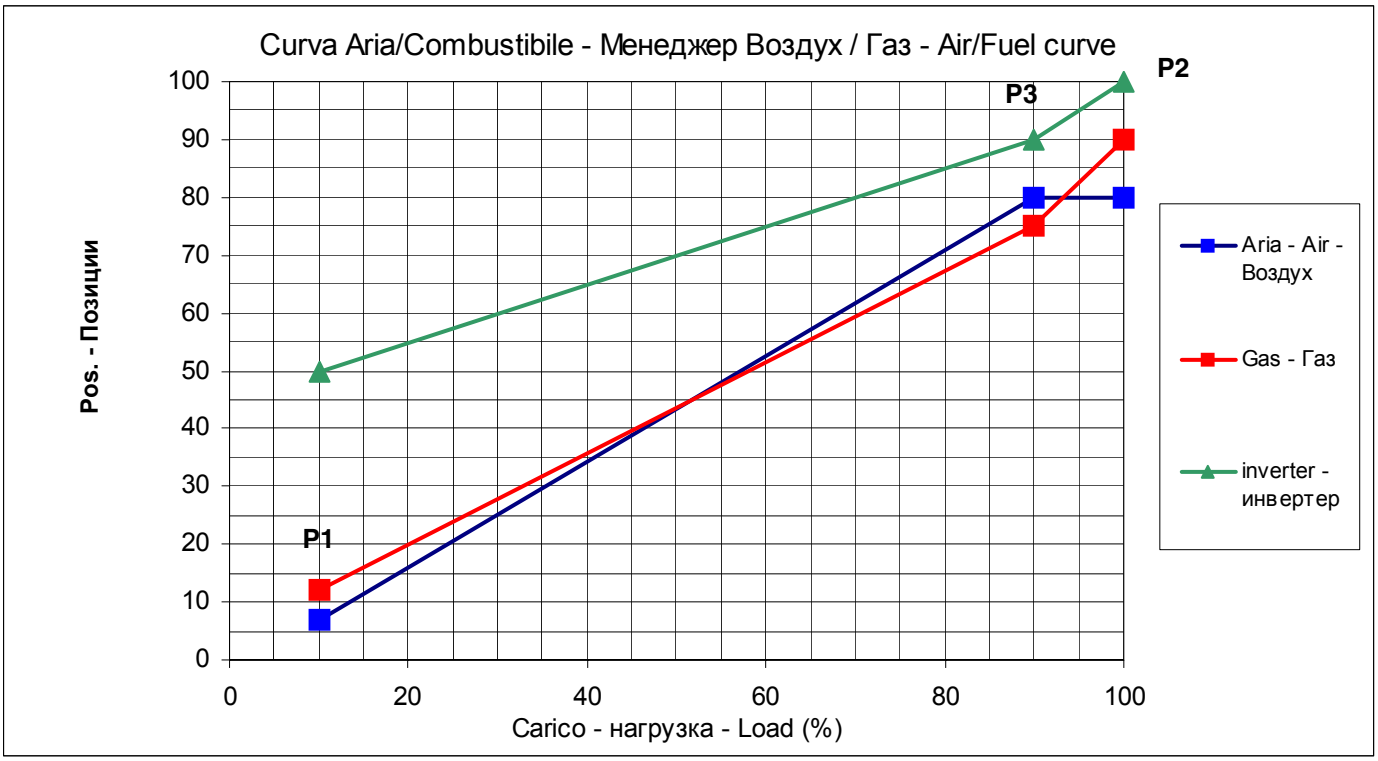
Point	Load	90
:3	Fuel	Load
O2	Air	85
	VSD	100

Change values by means of ↓ ↑

Supponendo di voler ridurre il combustibile ad un certo valore, per esempio a 75°, utilizzare ↓ ↑

Point	Load	90
:3	Fuel	
O2	Air	85
	VSD	100

Press Enter to confirm and go back to the actuator column, then choose the air actuator and change the values with the same procedure, to get the air excess values for that point. The P3 point is then set, positioned as shown:



Point	Load	100
:2	Fuel	90
O2	Air	85
	VSD	100

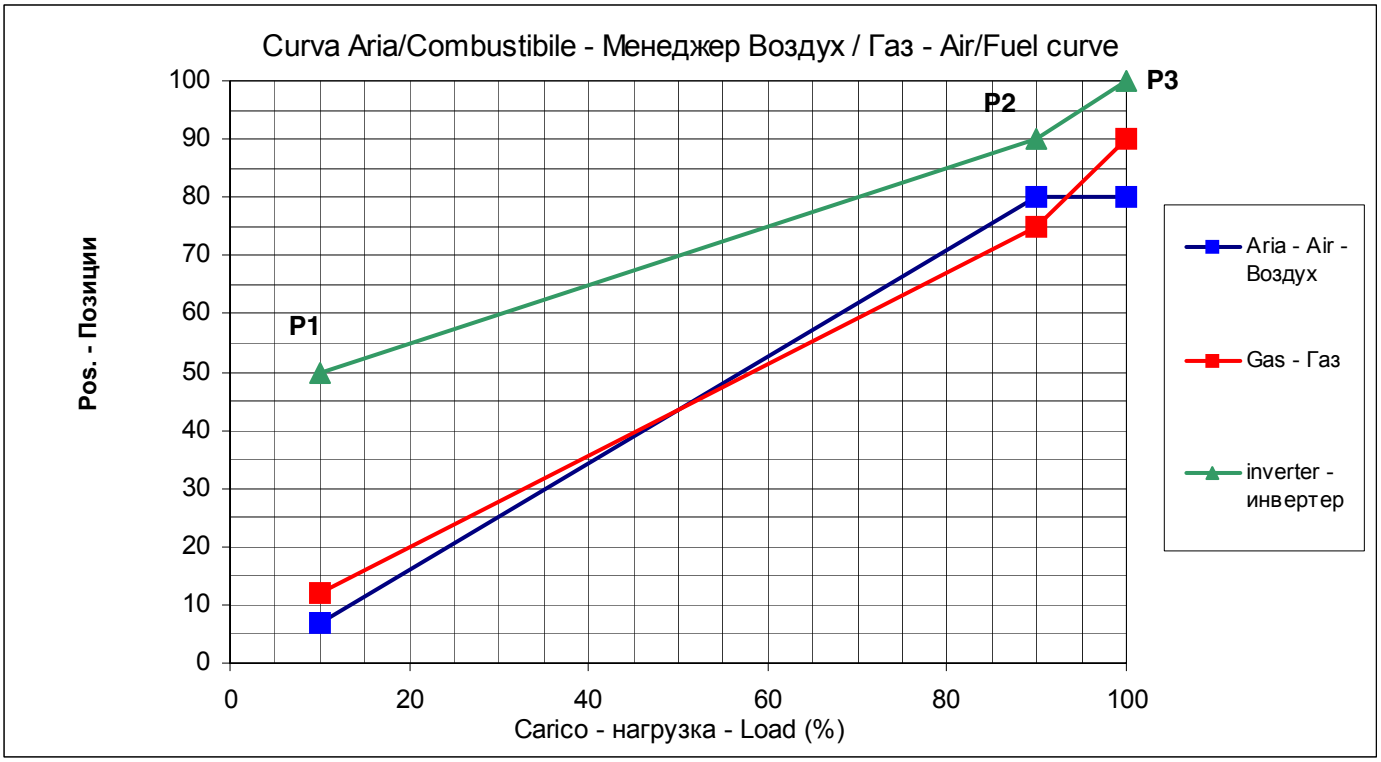
At the end of procedure, store the new point by exiting the actuators colums by pressing Esc .
To store the point, the display will show:

Store	Enter
Cancel	ESC

Press Enter to confirm the point

Do not directly exit by pressing Esc fromt the numeric column otherwise data will not be sotred.

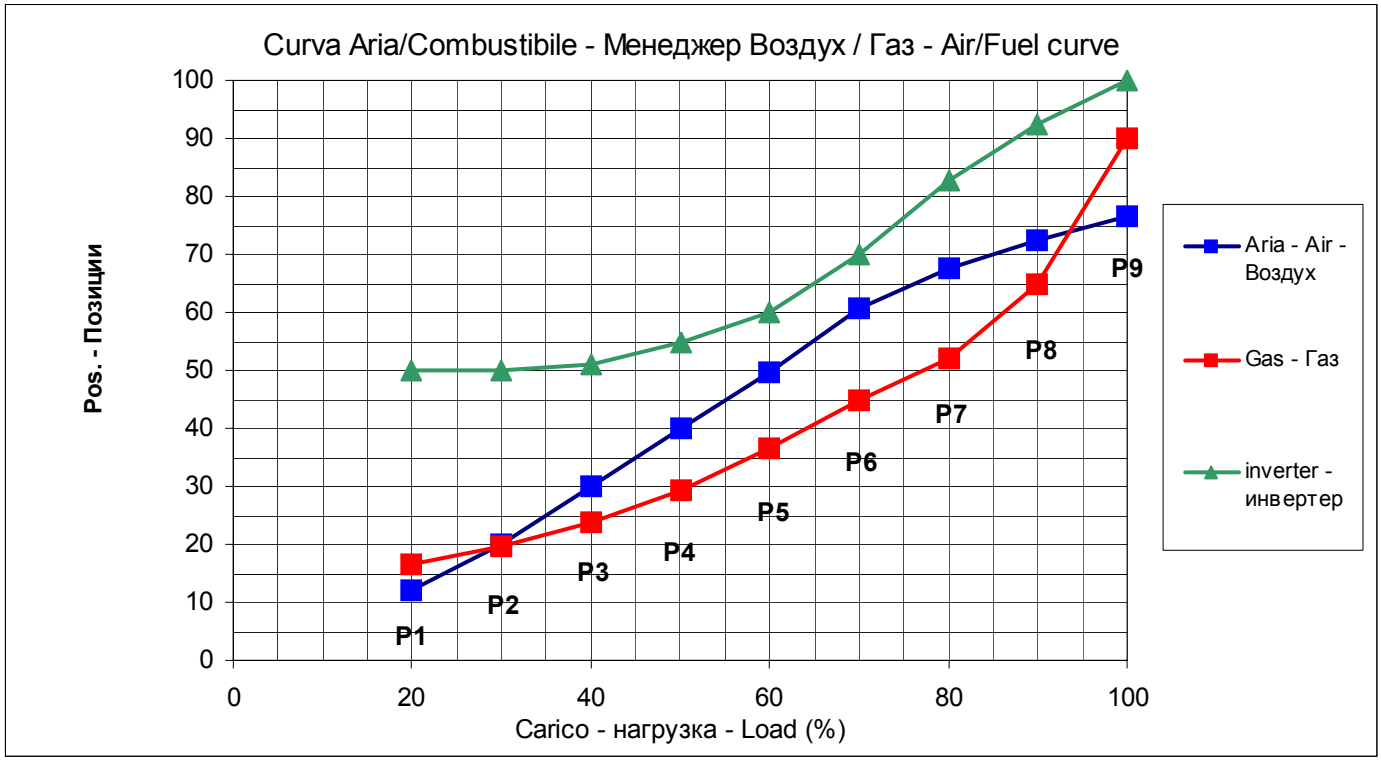
Once the point is stored, LMV will order the points automatically according to the load:



Go on setting the other points until the minimum load point is reached,as shown in the picture as example.
Maximum 15 points ca be set, usually 8-10 points can be enough.

Example of air/fuel ratio curve:

Load %	Air	Gas	VSD
20	12	16.6	50
30	20	19.7	50
40	30	23.8	51
50	40	29.3	55
60	49.7	36.6	60
70	60.7	45	70
80	67.6	52.1	82.8
90	72.4	65	92.4
100	76.6	90	100



Note: in case of burners provided with VSD, it is recommended not to go below 50% the motor speed.

Cold start thermal shock (CSTP)

If there is a steam boiler or a boiler that must start up cold in the plant and to avoid thermal shocks a slow heating is required for the boiler by mantaining the burner at the minimum output, the automatic function “Cold start thermal shock” can be performed insted of the manual operation at minimum load.

The CSTP (Cold Start Thermal Schock) function can be enabled by the Technical service only (access by reserved password).

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

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

Note: by enabling the manual operation (this function can be set at user level also -see chapter “manual operation”) the CSTP funciont is momentary excluded, when enabling the automatic operation again, the CSTP function (previously set at Service level) will be enabled as well.

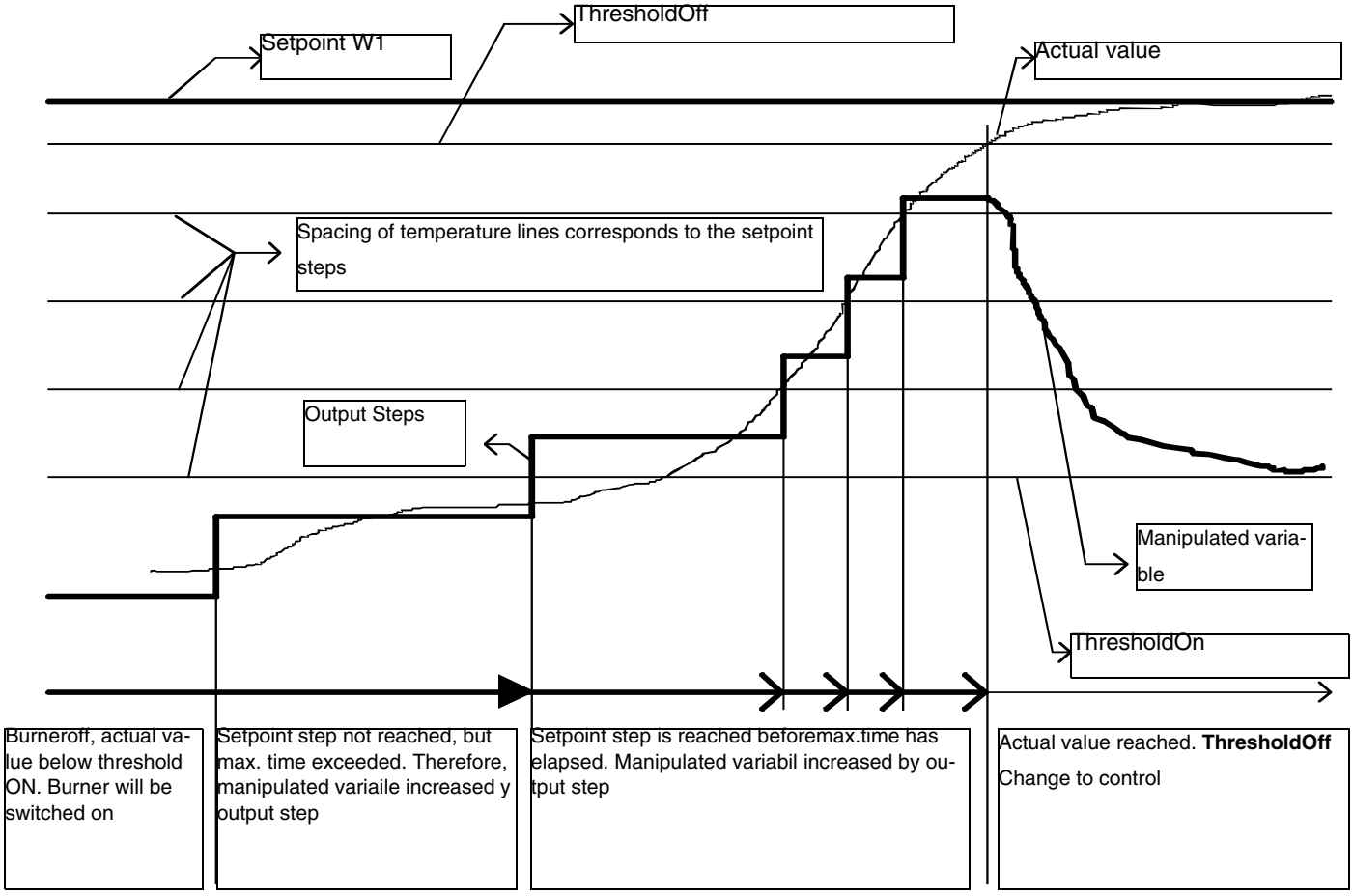
The CSTP function is a Service level paramter, to enable this function proceed as follows:

1st level	2nd level	3rd level	4th level	Range	Password	Default	Description
Params & Display							Menu level for making the parameter settings
	LoadController						Settings for the internal load controller
		ColdStart					Settings for the cold start (thermal shock protection)
			ColdStartOn	deactivated/activated	Service	deactivated/	Cold start thermal shock protection, activate / deactivate

The parameter **ColdStartOn** deactivates or activates the Cold start protection function, the other parameters are factory set and can be changed following the next programmig rows (see diagram)

			ThresholdOn	0...100%Wcurrent	Service	20%	Cold start thermal shock protection activation level referred to the current setpoint (Wcurrent)
			StageLoad	0..100%	Service	15%	Cold start thermal shock protection load step (modulating)
			StageSetp_Mod	1...100% Wcurrent	Service	5%	Cold start thermal shock protection setpoint step (modulating) referred to the current setpoint (Wcurrent)
			Stage-Setp_Stage	1...100% Wcurrent	Service	5%	Cold start thermal shock protection setpoint step (multistage) referred to the current setpoint (Wcurrent)
			MaxTme-Mod	1...63 min	Service	3 min	Cold start thermal shock protection, max. time per step (modulating)

			MaxTme-Stage	1...63 min	Service	3 min	Cold start thermal shock protection, maximum time per step (multistage)
			ThresholdOff	1...100% Wcurrent	Service	80%	Cold start thermal shock protection deactivation level referred to the current setpoint (Wcurrent)
			Additional-Sens	deactivated	Service	deactivated Pt100 Pt1000 Ni1000	Select extra sensor for cold start thermal shock protection
			Temp Cold-Start	---	User	0…2000 °C	Display of temperature acquired by extra sensor for the cold start thermal shock protection function
			Setpoint Add-Sensor	60 °C	Service	0...450 °C	Setpoint for extra sensor for cold start thermal shock protection
			Release Stages	release	Service	no release/ release	Cold start thermal shock protection load step stage mode (multistage operation)



BURNER MANUAL OPERATION

The operator can decide if choosing burner manual operation at a settable fixed load or modulating operation through the automatic load controller, then can also set the burner shutdown by means of the “burner off” function.
Choose the type of operation (Au-tom / Manual / Off).

1st level	2nd level	3rd level	Password	Description
ManualOpe-ration				Menu level for activating manual operation with the preselected load
	Au-tom/ Manual/Off			Selection of manual or automatic operation
		Automatic/ Burner on / Burner off	User	

Setting the load percentage for the manual operation

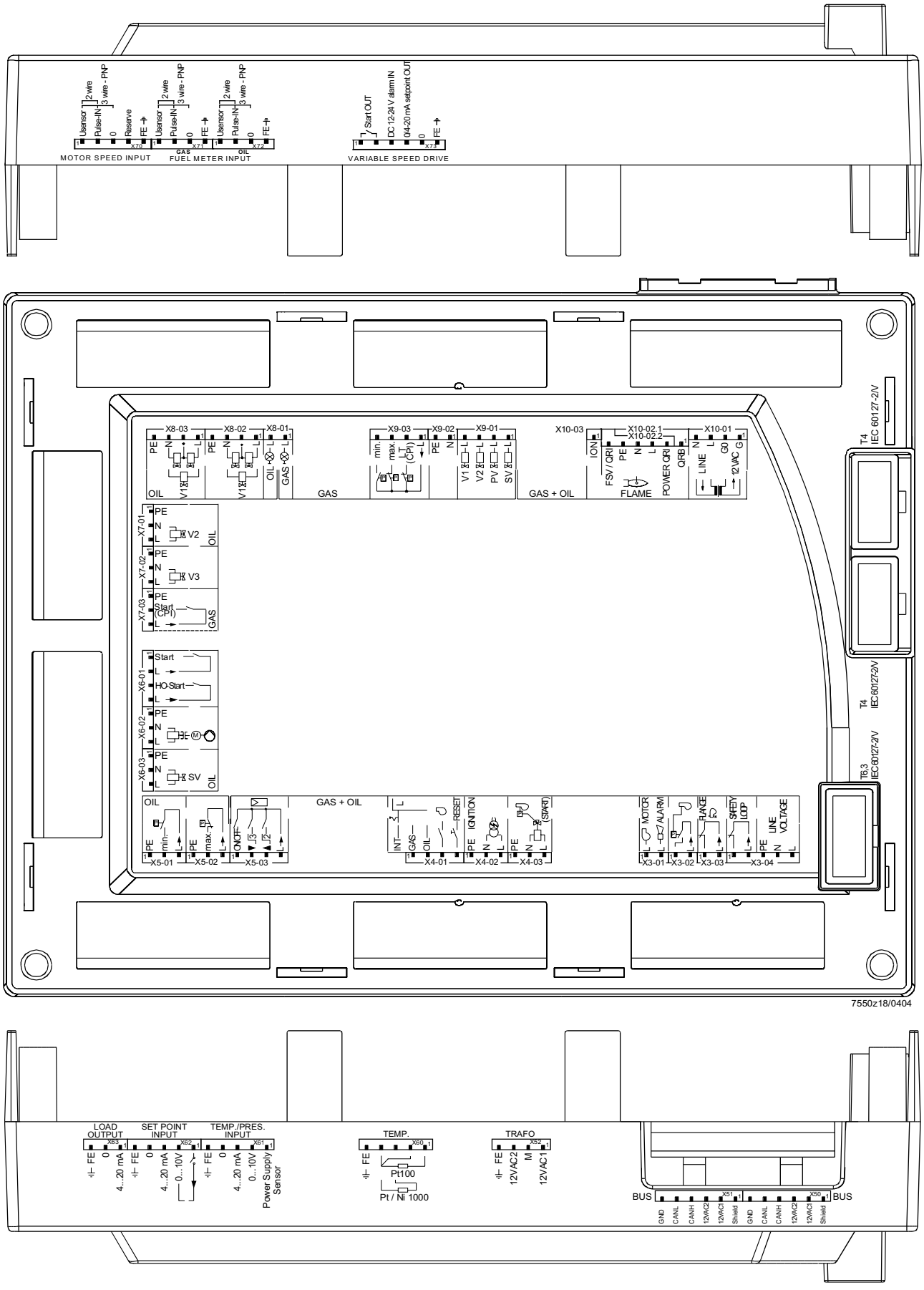
To set the load percentage at which the burner must operate in manual mode, proceed as described below.

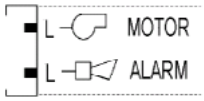
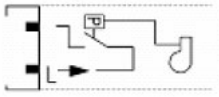
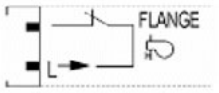
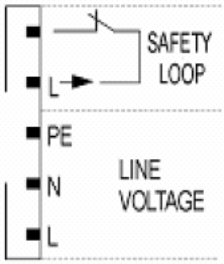
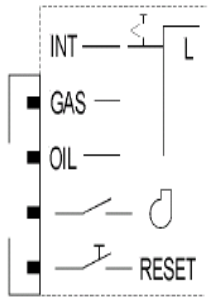
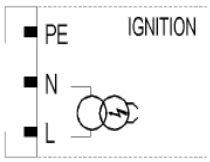
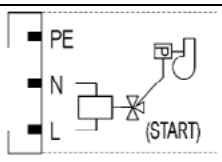
1st level	2nd level	3rd level	Password	Description
ManualOpe-ration				Menu level for activating manual operation with the preselected load
	SetLoad			Set target load
		0..100%	User	

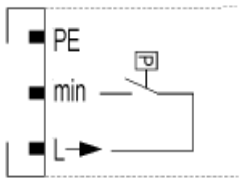
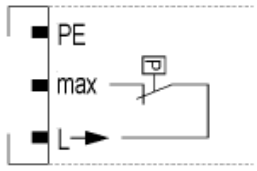
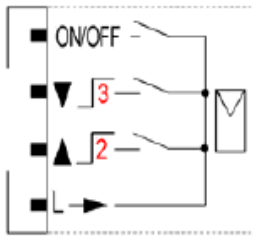
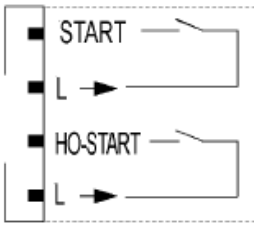
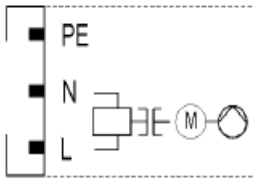
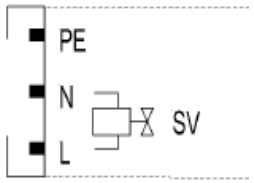
ELECTRICAL CONNECTIONS AT 230 V

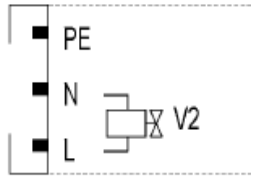
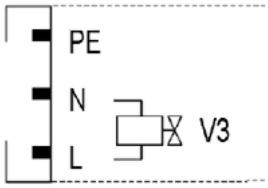
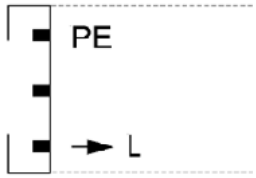
Terminal Blocks

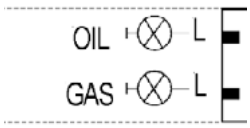
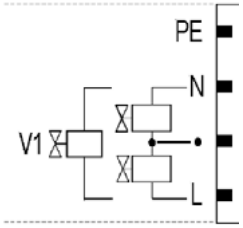
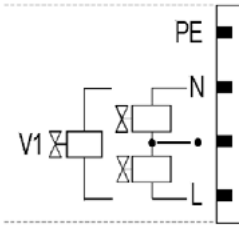
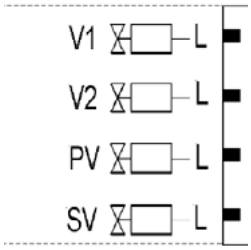
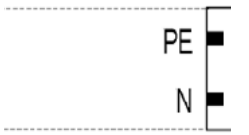
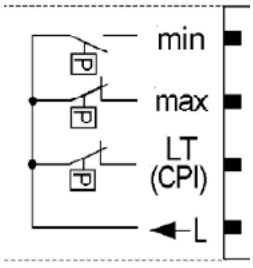
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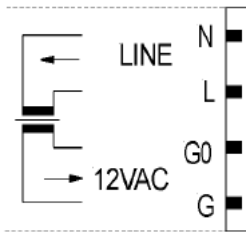
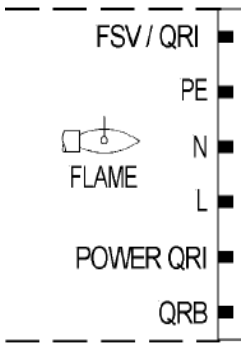
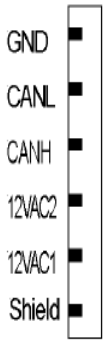
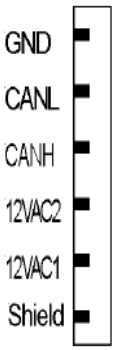


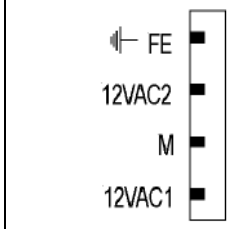
Terminal group	Connection symbol		Input	Output	Description of connection terminals	Electrical rating
X3-01	PIN1			x	Fan motor contactor	AC 230 V +10 % / -15 %, 50...60 Hz, 1 A, cos.0.4
	PIN2			x	Alarm	AC 230 V +10 % / -15 %, 50...60 Hz, 1 A, cos.0.4
X3-02	PIN1		x		Air pressure switch (LP)	AC 230 V +10 % / -15 %, 50...60 Hz, Imax 1.5 mA
	PIN2			x	Power signal for air pressure switch (LP)	AC 230 V +10 % / -15 %, 50...60 Hz, Imax 500 mA
X3-03	PIN1		x		End switch burner flange	AC 230 V +10 % / -15 %, 50...60 Hz, Imax 5 A
	PIN2			x	Power signal for end switch burner flange	AC 230 V +10 % / -15 %, 50...60 Hz, Imax 5 A
X3-04	PIN1		x		Safety loop	AC 230 V +10 % / -15 %, 50...60 Hz, Imax 5 A
	PIN2			x	Power signal for safety loop	AC 230 V +10 % / -15 %, 50...60 Hz, Imax 5 A
	PIN3		x		Protective earth (PE)	
	PIN4		x		Supply voltage neutral conductor (N)	
	PIN5		x		Supply voltage live conductor (L)	AC 230 V +10 % / -15 %, 50...60 Hz, fuse 6.3 AT (DIN EN 60 127 2 / 5)
X4-01					Fuel selection “internal” if pin 1-2 is not used	
	PIN1		x		Fuel selection gas	AC 230 V +10 % / -15 %, 50...60 Hz, Imax 1.5 mA
	PIN2		x		Fuel selection oil	AC 230 V +10 % / -15 %, 50...60 Hz, Imax 1.5 mA
	PIN3		x		Fan contactor contact (FCC) or flue gas recirculation pressure switch	AC 230 V +10 % / -15 %, 50...60 Hz, Imax 1.5 mA
	PIN4		x		Reset / manual lockout	AC 230 V +10 % / -15 %, 50...60 Hz, Imax 1.5 mA
X4-02	PIN1			x	Protective earth (PE)	
	PIN2			x	Neutral conductor (N)	
	PIN3			x	Ignition	AC 230 V +10 % / -15 %, 50...60 Hz, 2 A, cos.0.2
X4-03	PIN1			x	Protective earth (PE)	
	PIN2			x	Neutral conductor (N)	
	PIN3			x	Start signal or pressure switch relief (air pressure switch test valve)	AC 230 V +10 % / -15 %, 50...60 Hz, 0.5 A, cos.0.4

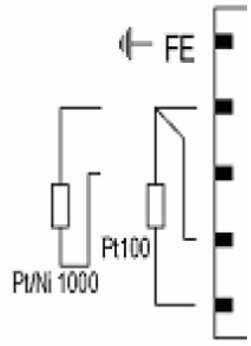
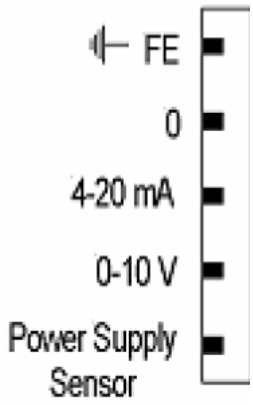
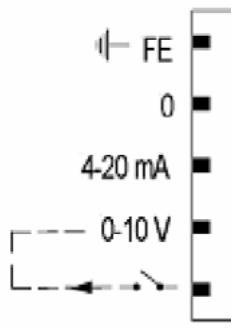
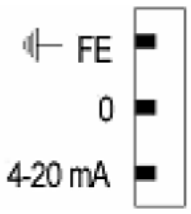
Terminal group	Connection symbol		Input	Output	Description of connection terminals	Electrical rating
X5-01	PIN1			x	Protective earth (PE)	
	PIN2		x		Pressure switch min-oil (DWmin-oil)	AC 230 V +10 % / -15 %, 50...60 Hz, Imax 1.5 mA
	PIN3			x	Power signal for pressure switch-min-oil (DWmin-oil)	AC 230 V +10 % / -15 %, 50...60 Hz, Imax 500 mA
X5-02	PIN1			x	Protective earth (PE)	
	PIN2		x		Pressure switch-max-oil (DWmax-oil)	AC 230 V +10 % / -15 %, 50...60 Hz, Imax 1.5 mA
	PIN3			x	Power signal for pressure switch-max-oil (DWmax-oil)	AC 230 V +10 % / -15 %, 50...60 Hz, Imax 500 mA
X5-03	PIN1		x		Controller (ON / OFF)	AC 230 V +10 % / -15 %, 50...60 Hz, Imax 1.5 mA
	PIN2		x		Controller closes / stage 3	AC 230 V +10 % / -15 %, 50...60 Hz, Imax 1.5 mA
	PIN3		x		Controller opens / stage 2	AC 230 V +10 % / -15 %, 50...60 Hz, Imax 1.5 mA
	PIN4			x	Power signal for control of controller	AC 230 V +10 % / -15 %, 50...60 Hz, Imax 500 mA
X6-01	PIN1		x		Start release oil	AC 230 V +10 % / -15 %, 50...60 Hz, Imax 1.5 mA
	PIN2			x	Power signal start release oil	AC 230 V +10 % / -15 %, 50...60 Hz, Imax 500 mA
	PIN3		x		Direct heavy oil start	AC 230 V +10 % / -15 %, 50...60 Hz, Imax 1.5 mA
	PIN4			x	Power signal direct heavy oil start	AC 230 V +10 % / -15 %, 50...60 Hz, Imax 500 mA
X6-02	PIN1			x	Protective earth (PE)	
	PIN2			x	Neutral conductor (N)	
	PIN3			x	Oil pump / magnetic coupling	AC 230 V +10 % / -15 %, 50...60 Hz, 2 A, cos.0.4
X6-03	PIN1			x	Protective earth (PE)	
	PIN2			x	Neutral conductor (N)	
	PIN3				Fuel valve (shutoff valve-oil)	AC 230 V +10 % / -15 %, 50...60 Hz, 1 A, cos.0.4

Terminal group	Connection symbol		Input	Output	Description of connection terminals	Electrical rating
X7-01	PIN1			x	Protective earth (PE)	
	PIN2			x	Neutral conductor (N)	
	PIN3				Fuel valve 2 (oil)	AC 230 V +10 % / -15 %, 50...60 Hz, 1 A, cos.0.4
X7-02	PIN1			x	Protective earth (PE)	
	PIN2			x	Neutral conductor (N)	
	PIN3				Fuel valve 3 (oil)	AC 230 V +10 % / -15 %, 50...60 Hz, 1 A, cos.0.4
X7-03	PIN1			x	Protective earth (PE)	
	PIN2		x		Start release gas CPL (LMV52...)	AC 230 V +10 % / -15 %, 50...60 Hz, Imax 1.5 mA
	PIN3			x	Power signal (reserve)	AC 230 V +10 % / -15 %, 50...60 Hz, Imax 500 mA

Terminal group	Connection symbol		Input	Output	Description of connection terminals	Electrical rating
X8-01		PIN2		x	Firing on oil	AC 230 V +10 % / -15 %, 50...60 Hz, 1 A, cos.0.4
		PIN1		x	Firing on gas	AC 230 V +10 % / -15 %, 50...60 Hz, 1 A, cos.0.4
X8-02		PIN4		x	Protective earth (PE)	
		PIN3		x	Neutral conductor (N)	
		PIN2		x	Wiring point for valves connected in series	
		PIN1		x	Fuel valve 1 (oil)	AC 230 V +10 % / -15 %, 50...60 Hz, 1 A, cos.0.4
X8-03		PIN4		x	Protective earth (PE)	
		PIN3		x	Neutral conductor (N)	
		PIN2		x	Wiring point for valves connected in series	
		PIN1		x	Fuel valve 1 (oil)	AC 230 V +10 % / -15 %, 50...60 Hz, 1 A, cos.0.4
X9-01		PIN4		x	Fuel valve 1 (gas)	AC 230 V +10 % / -15 %, 50...60 Hz, 2 A, cos.0.4
		PIN3		x	Fuel valve 2 (gas)	AC 230 V +10 % / -15 %, 50...60 Hz, 2 A, cos.0.4
		PIN2		x	Fuel valve (gas)	AC 230 V +10 % / -15 %, 50...60 Hz, 2 A, cos.0.4
		PIN1		x	Fuel valve (shutoff valve-(gas)	AC 230 V +10 % / -15 %, 50...60 Hz, 2 A, cos.0.4
X9-02		PIN2		x	Protective earth (PE)	
		PIN1		x	Neutral conductor (N)	
X9-03		PIN4	x		Pressure switch-min-gas, start release gas	AC 230 V +10 % / -15 %, 50...60 Hz, Imax 1.5 mA
		PIN3	x		Pressure switch-max-gas (DWmax-gas)	AC 230 V +10 % / -15 %, 50...60 Hz, Imax 1.5 mA
		PIN2	x		Pressure switch-valve proving-gas / leakage test or valve closing contact (CPI)	AC 230 V +10 % / -15 %, 50...60 Hz, Imax 1.5 mA
		PIN1		x	Power signal for pressure switch	AC 230 V +10 % / -15 %, 50...60 Hz, Imax 500 mA

Terminal group	Connection symbol		Input	Output	Description of connection terminals		Electrical rating
X10-01		PIN4		x	Neutral conductor (N)		AC 230 V +10 % / -15 %, 50...60 Hz, max 1 mA
		PIN3		x	Power signal transformer		
		PIN2	x		AC power signal GO		AC 12 V +10 % / -15 %, 50...60 Hz, max 1.2 mA
		PIN1	x		AC power signal fan motor (G)		
X10-02		PIN6	x		QRI... (IR detector) / QRA7... signal voltage		Umax DC 5 V
		PIN5		x	Protective earth (PE)		
		PIN4		x	Neutral conductor (N)		
		PIN3		x	Power signal		AC 230 V +10 % / -15 %, 50...60 Hz, Imax 500 mA
		PIN2		x	QRI... (IR detector) / QRA7... power supply		DC 14 / 21 VC Imax 100 mA
		PIN1	x		QRB... signal voltage		Max. DC 8 V
X10-03		PIN1		x	Ionization probe (ION) (alternatively QRA2…/ QRA4.U/QRA10…, refer to section *Description of inputs and out-puts*)		Umax (X3-04-PINS) Imax. 0.5 mA
X50		PIN6		x	Reference ground (PELV)		
		PIN5		x	Communication signal (CANL)		DC U <5 V, Rw = 120 Ù, level to ISO-DIS 11898
		PIN4		x	Communication signal (CANH)		
		PIN3		x	AC power supply for actuators / display and operating unit AZL5...		AC 12 V +10 % / -15 %, 50...60 Hz, Fuse max. 4 A
		PIN2		x	AC power supply for actuators / display and operating unit AZL5...		
		PIN1		x	Shield connection	(functional earth)	
X51		PIN6		x	Reference ground (PELV)		
		PIN5		x	Communication signal (CANL)		DC U <5 V, Rw = 120 Ù, level to ISO-DIS 11898
		PIN4		x	Communication signal (CANH)		
		PIN3		x	AC power supply for actuators / display and operating unit AZL5...		AC 12 V +10 % / -15 %, 50...60 Hz, Fuse max. 4 A
		PIN2		x	AC power supply for actuators / display and operating unit AZL5...		
		PIN1		x	Shield connection	(functional earth)	

X52		PIN4	x		(functional earth)		
		PIN3	x		AC power supply from transformer to LMV5... system		AC 12 V +10 % / -15 %, 50...60 Hz
		PIN2	x		Reference ground (PELV)		
		PIN1	x		AC power supply from transformer to LMV5... system		AC 12 V +10 % / -15 %, 50...60 Hz

Terminal group	Connection symbol		Input	Output	Description of connection terminals	Electrical rating
Temperature / pressure controller						
X60		PIN5	x		Functional earth for shield connection	
		PIN4	x		Reference ground	
		PIN3	x		Temperature sensor input Pt / LG-Ni 1000	
		PIN2	x		Line compensation temperature sensorPT100	
		PIN1	x		Temperature sensor input PT100	
X61		PIN5	x		Functional earth for shield connection	
		PIN4	x		Reference ground	
		PIN3	x		Current input for temperature / pressure signal 0/4...20 mA	DC 0/4...20 mA
		PIN2	x		Voltage input for temperature / pressure signal DC 0...10 V	DC 0...10 V
		PIN1		x	Power supply for temperature / pressure transmitter	approx. DC 20 V Max. 25 mA
X62		PIN5	x		Functional earth for shield connection	
		PIN4	x		Reference ground	
		PIN3	x		Current input for setpoint or load	DC 0...20 mA
		PIN2	x		Voltage input for setpoint or load	DC 0...10 V
		PIN1		x	Power supply for setpoint changeover	approx. DC 24 V Max. 2 mA
X63		PIN3	x		Functional earth for shield connection	
		PIN2		x	Reference ground	
		PIN1		x	Current output for burner(LOAD OUTPUT)	DC 4...20 mA, RLmax = 500 £[

PROGRAMMING THE VSD

To program the VSD, use the BOP interface panel.



BOP - SED2

The BOP allows setting the parameters in order to set the VSD specifically for the motor used It has keys and a 5 position LCD: it shows the parameter numbers rxxxx or Pxxxx, the parametric values, the paramter unit (i.e. [A], [V], [HZ], [s]), alarms Axxxx or fault signalling Fxxxx and the reference and actual values.

ATTENTION! the VSD is factoy set for the burner fan motor, then it is no necessary to programming it.

The following procedure can be used only if the VSD is to be reaplced with a new not parametrized VSD, or if the VSD must be set to use it coupled to another motor (in this case check if the VSD maximum output matches the power requested by the motor).

The following procedure restes the parameters on default value set by Siemens and it allows setting only the parameters necessary for the burner operation. By means of this procedure, parameters accidentally set can be cancelled.

Description of the SED2 VSD key functions

Display/keys	Functions	Descriptions
	Status display	The LCD (5-digit display for BOP, multiline clear text display for AOP) shows the settings presently used by the VSD or used to parameterize the VSD).
	Start motor	Pressing this button starts the VSD. This button is enabled for manual mode as part of the factory setting.
	Stop motor	OFF1 Pressing this button stops the VSD within the selected ramp-down time. This button is enabled for manual mode as part of the factory setting. OFF2 Pressing this button twice (or once with sustained pressure) causes the motor to coast freely to a standstill. This function is enabled in the manual and automatic operating modes.
	Changeover to manual control	Pressing this button while the VSD is running sets the input logic so that the operator controls the SED2. In this mode, none of the controlled variables have any influence on the control of the VSD.
	Changeover to automatic control	In automatic mode, all I/Os are set to represent the system-dependent variables. No manual inputs are accepted. The controller responds to changes depending on its parameter setting. However, it is possible to change system parameters in automatic mode.
	Functions	This button allows for displaying additional information. Also refer to the section *Buttons with special functions* in the AOP Operating Instructions. **Multiple display mode:** when you press this button for 2 seconds during operation, the following information is displayed regardless of the parameter: 1. DC link voltage (indicated by d – units V). 2. Output current (A). 3. Output frequency (Hz). 4. Output voltage (indicated by o – units V). 5. The value selected in P0005 (if P0005 is configured to display any of the above (1 to 4), the value is not redisplayed). Briefly press the button repeatedly to cycle through the above displays. Pressing again this button for a sustained time exits the multiple display mode. **Error acknowledgement:** when a fault occurs and the SED2 trips, use this button to acknowledge the error. **Jump function:** you can jump from any parameter (rXXXX or PXXXX) directly to r0000 by pressing the Fn button briefly. This allows you to modify another parameter if required. After jumping to r0000, press the Fn button again to return to the starting point.
	AOP only	Pressing buttons Fn and P simultaneously opens the main menu.
	Access to parameters	Pressing this button allows you to: 1. Access the parameters 2.: Exit the parameter by accepting its value.
	Increase value	Press this button to increase the value displayed. This button helps increase the current value during parameterization. In manual mode, this button allows for increasing the speed (internal motor potentiometer).
	Decrease value	Press this button to decrease the value displayed. This button helps decrease the current value during parameterization. In manual mode, this button allows for decreasing the speed (internal motor potentiometer).

Programming

To enter the programming mode, proceed as follows:

1 press key “P” 

2 message Γ000  will be displayed;

3 press  until, parameter **“P0010”** is displayed;

4 press “P” to enter the page then by pressing  change **function from 0 to 1** to program the quick pages;

5 press “P” again to confirm and exit.

Successively, by pressing  go to next pages, and with the same procedure set next data:

Page	Description	Value to be set
P0304	Rated motor voltage	usually 400V
P0305	Rated motor current	
P0307	Rated motor power	
P0310	Rated motor frequency	usually 50Hz
P0311	Rated motor speed	M-1
P1080	Min. motor frequency	usually 0Hz
P1082	Max. motor frequency	usually 50Hz
P1120	Ramp-up time	usually 20 sec.
P1121	Ramp-down time	usually 20 sec.

6 now, to automatically execute the calculating procedure of the parameters,

7 choose page **P3900**

8  press  to pass from 0 to **1**;

9  press  to confirm: the calculating procedure of the parameters will be executed.

10 Once the above pages are set, press “P” to exit the programming mode.

Attention, once the parameters calculation is executed through function **“P3900”**, the function **“P0010”**, that was previously set **from 0 to 1**, is automatically reset to **0**. Infacts, if function **“P0010”**, will remain on **1**,VSD would stay on programming mode and could not work.

Note: to exit manually from the programming mode, go back to page **“P010”**, press  and  , change **from 1 to 0** to end the programming function.

Attention: any manual exit without parameter calculation in **“P3900”**, does not allow correct VSD parameter setting.

Attention: once the calculation in ”P3900” is performed, the VSD reset some paramters on default setting, as for example the maximum frequency on “P2000”, then it will be necessary to change again some settings

Proceed as follows:

11 press 

12 press  until “P0003” () is shown;

13 press “P” to enter: change function from **1 to function 3** (that allows showing all the pages); then press “P” to confirm and exit.

14 press  until **“P0006”** is shown (**Visualisation of the output frequency**): press  function from **2 to function 4** then press .

15 Choose page **“P0700”**(**Selection of command source**): to select the command source press  to enter the relevant page and see **“IN000”** (Automatic mode supply): then, **choose 2** (in order that the input signal comes from terminals, in automatic mode);

16 press  to enter again into **“P0700”**;

17 press ▲ to choose **“IN001”** (Manual mode supply),

18 **choose 1** (input signal from BOP for manual mode operation);

19 the choose page **“P0756”** (**Type of input signals**)

20 press P to enter **“IN000”**

21 **set 2** (to select the 0÷20 mA input signal)

22 then press P and ▲ again.

Only for MM440 VSD

23 Choose page **“P1237”** (**Enablign breaking resistors**): set **1**, or choose values on the following table:

0 – not enabled

1 – 5% duty cycle

2 – 10% duty cycle

3 – 20% duty cycleo

4 – 50% duty cycleo

5– 100% duty cycle

24 Then select **“P1820”** (**motor direction of rotation**) and set the required direction

25 by means of ▲ choose **“P2000”** (**Max. Frequency**): press P to enter the page and press ▲ to set frequency at **52,60 Hz;**

26 press P again to confirm and exit.

27 Go back to **“P0003”** then from **3 to1.**

28 Go back to page **Γ000**

29 Exit by pressing Fn

Attention: remember to select also the two micro-DIP-Swicthes to “On” postion

Note: the device automatically go back to main visualisation if no key is pressed within some seconds.

Attention: parameter **P0640** represents factor “% motor overload” (ampere) while paramter **P0305** represents the rated current.

Once switched off, wait for at least 5 minutes, before opening the device. The line capacitors are at a dangerous voltage also after switching off. Terminals L1, L2, L3, U, V, W can be at dangerous voltage even if the VSD is not working.

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

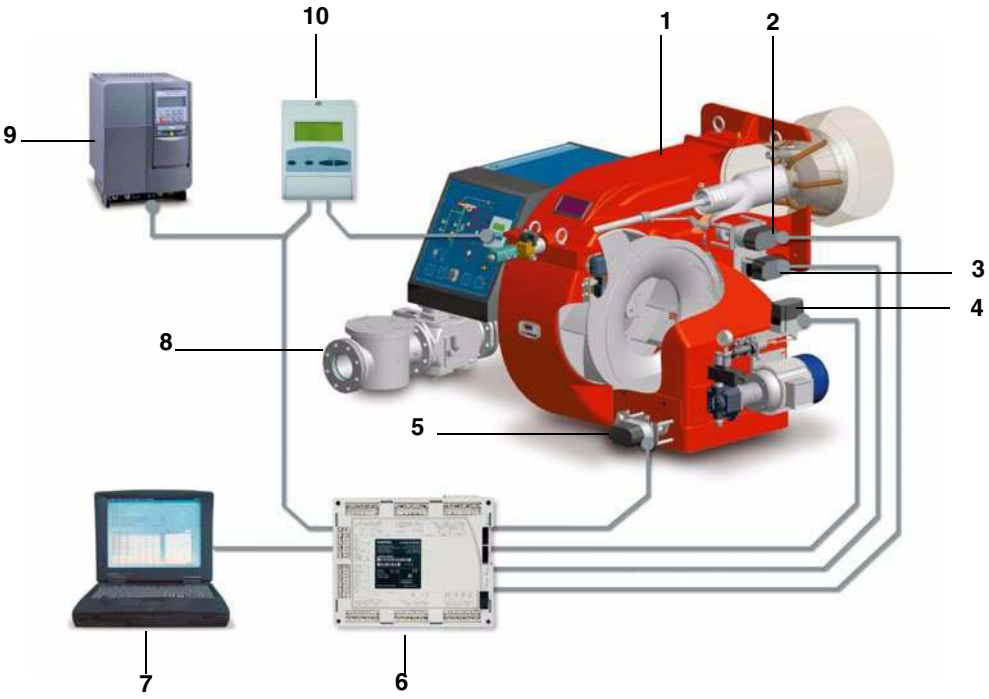
Siemens LMV 5x



User manual

M12914CA Rev.0 03/2008

SIEMENS LMV CONTROLLED BURNERS



Keys

1 Burner
2 Combustion head actuator
3 Gas butterfly valve actuator
4 Oil pressure governor actuator
5 Air damper actuator
6 Siemens LMV burner control
7 Personal Computer
8 Gas train
9 Inverter
10 Siemens AZL User interface

The control system is made of the Siemens LMV central unit (6) that performs all the burner control functions and of the Siemens AZL local programming unit (10) that interfaces the system with the user.

Main features:

- no mechanical linkages
- built-in burner control box
- built-in gas proving system
- more flame checking devices available for several applications
- PID load controller
- up to six actuators can be controlled. Each of them is independent for the best burner setup
- best air/fuel ratio. Repeatability and precision of set adjustments
- Modbus communication
- multilevel password
- settings via PC
- adjustable prepurging time (according to the relevant Standards)
- continuous ventilation
- post purging (adjustable time)
- proving system settable to on and off
- adjustable proving system time for all the valve volumes
- load controller settable to on and off
- thermal shock protection function settable to on and off (for cold starts)
- continuous operation and flame detection probe

Note: the picture above shows a complete control system.

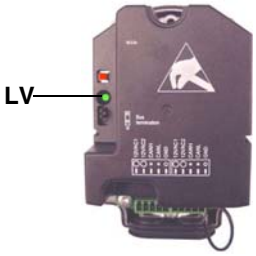
USER SETTINGS

Go on adjusting the burner.
Users can set only the LMV parameters that can be accessed without password: (see “Adjusting the temperature set-point”).
The Siemens AZL User Interface allows programming the Siemens LMV control box and monitoring the system data.



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

To know the actuator functions, proceed as follows:
1 remove the actuator covers



2 check the number of the **LV** green LED blinks for each actuator:

Blinks	Actuator function
1 blink	air damper actuator
2 blinks	gas butterfly valve actuator
3 blinks	oil pressure governor actuator
4 blinks	auxiliary actuator
5 blinks	auxiliary actuator
6 blinks	auxiliary actuator

CAUTION: it is recommended not to adjust the actuators. Anyway, never press the actuator red button, otherwise the fundamental parameters, necessary for the burner operation, will be cancelled. The burner will therefore continuously lock out.

Start-up procedure

1 Turn the burner on according to the following:

- ual fuel burners: choose the requested fuel by means of the related control panel switch
- one fuel burners: turn the burner on by means of the burner main switch (placed on the burner control panel)

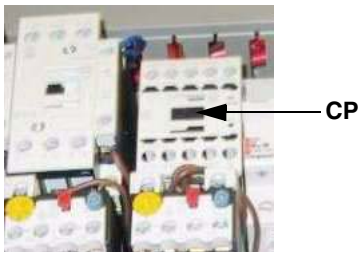
2 the LMV controller starts the system test cycle: the AZL display shows the **System Test** message; at the end of the test, it shows the main page and the system stops (the safety chain is open) waiting for the startup enabling signal (standby - Program phase no. 12)

Setpoint	80°C
Act value	
78°C	
Fuel	GAS

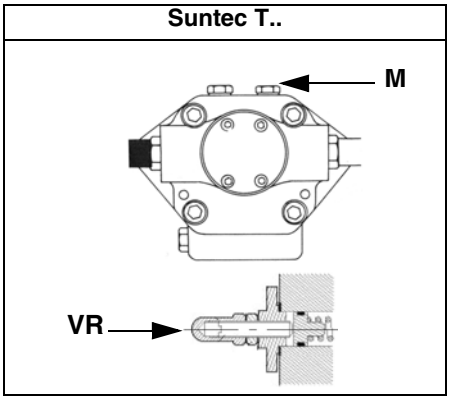
Main page

3 check the fan motor rotation;

4 (light/heavy oil burners) with the electrical panel open, prime the oil pump acting directly on the related **CP** contactor (see next picture): check the pump motor rotation and keep pressing for some seconds until the oil circuit is charged;



5 bleed the air from the **M** pressure gauge port (see next picture) by loosing the cap without removing it, then release the contactor.



6 make the safety chain enabling the system to start up

7 the combustion cycle starts:

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

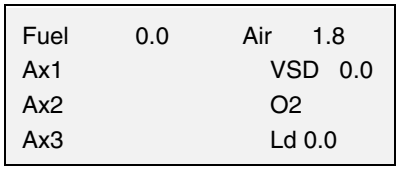
Once the ignition cycle ends, the main page is shown:



Main page

Set point: temperature set-point
Act value: actual temperature value
Load: load percentage (burner output)
Flame: percentage of flame detection current.

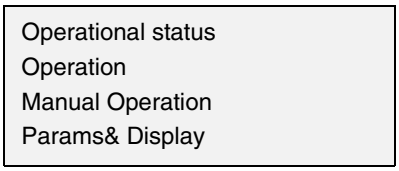
By pressing the ENTER key the display shows the second page:



Second page

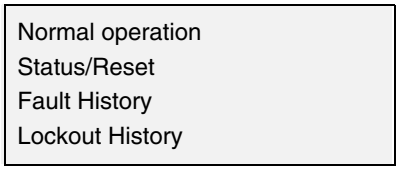
Fuel: it shows (in degrees) the fuel actuator position.
Air: it shows (in degrees) the air actuator position.
Ax1..3: auxiliaries.
VSD: % value on the inverter maximum frequency
O2: oxygen percentage
Ld: load percentage (burner output).

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



Main menu

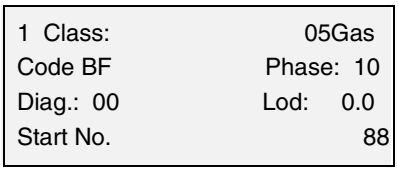
By pressing the ESC key once, the ***Operational Status*** (first item in the main menu) menu is directly shown:



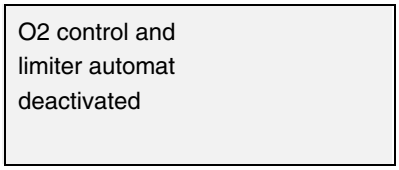
the ***Operational Status*** menu provides the following items:
Normal operation: by selecting this item and pressing the ENTER key, the main page is shown; press ESC to go back to the main menu.
Status/Reset: it shows system errors or faults occuring / it represents the lockout reset function.
Fault History: by selecting this item and pressing the ENTER key, the Lockout History will be shown about the last 21 faults occured.
Lockout History: by selecting this item and pressing the ENTER key, the Lockout History will be shown about the last 9 lockouts occured, and the related date and hour.
Alarm act/deact: enable/disable the horn in case of alarm.

Fault History

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



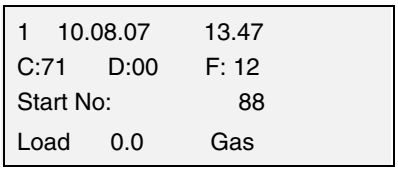
alternating by an error message as:



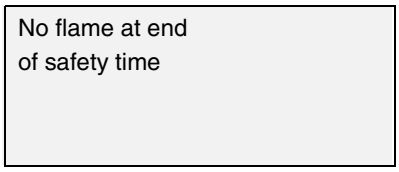
To see the other Fault History pages, press the arrow keys.
To exit the Fault History pages, press ESC.

Lockout History

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



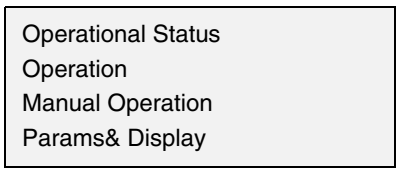
alternating by an error message as:



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

Setting the temperature set-point value

To set the temperature set-point value, that is the generator operating temperature; proceed as follows.
From the main page, enter the main menu by pressing the ESC key twice:



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

Access w-out PW
Access Serv
Access OEM
Access LS

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

BurnerControl
RatioControl
O2Contr./Guard.
LoadController

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

ControllerParam
Configuration
Adaption
SW Version

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

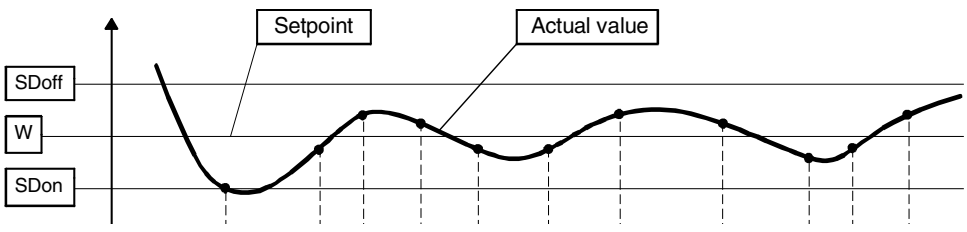
ContrlParamList
MinActuatorStep
SW_FilterTmeCon
SetPointW1

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

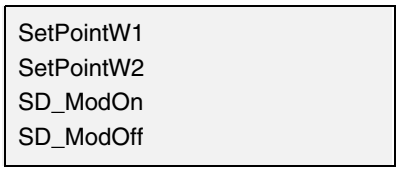
SetpointW1
Curr: 90°
New: 90°

Curr: it shows the current set-point; use the arrows keys to change it.
NOTE: the available range depends on the probe used; the measure unit of the detected data and its relevant limits are set by “Service” level parameters.
Once the new set-point is set, confirm by pressing ENTER, otherwise exit without changings by pressing ESC.
Press ESC to exit the set-point programming mode.

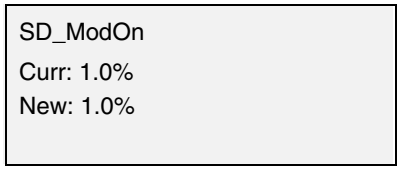
Once the temperature set-point W1 is imposed, set the Switch-on (SDon) and the Switch-off (SDoff) point of the 2-position controller:



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



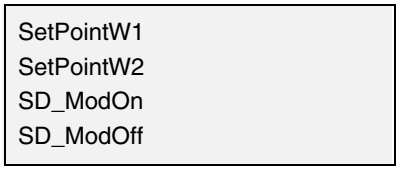
the display will show:



The deafult value for this parameter is1% that is, the burner will light again at a temperature 1% lower than the set-point.

Change value, if needed, by means of the arrow keys; press ENTER to confirm and the press ESC to exit. Press only ESC to exit without changing.

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



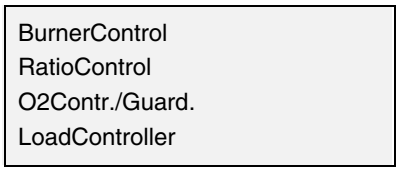
the display will show:



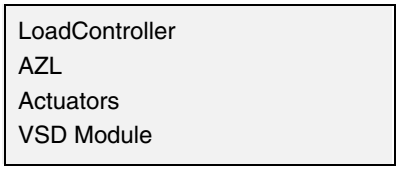
The deafult value for this parameter is10% that is, the burner will turn off at a temperature 1% higher than the set-point.

Change value, if needed, by means of the arrow keys; press ENTER to confirm and the press ESC to exit. Press only ESC to exit without changing.

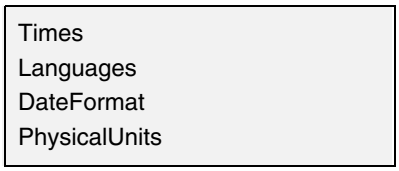
Press the ESC key until the following menu is shown:



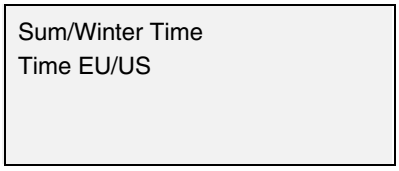
scroll this menu down until the tiem “AZL” is reached



confirm by pressing ENTER:

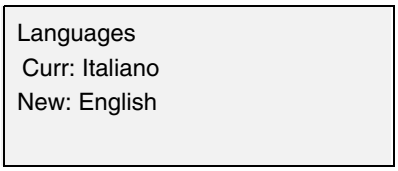


Times: it sets the “Summer (SUM) Time / Winter (WIN) Time” operation and the continent (EU - Europe; US - United States)



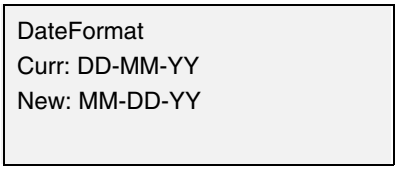
choose the Summertime/Wintertime mode desired and cofirm by pressing ENTER; press ESC to exit.
Set the time zone (Time EU/US) in the same way.

Languages: it allows setting the current language

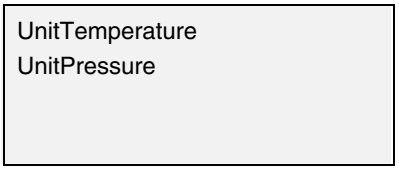


choose the desired language and cofirm by pressing ENTER; press ESC to exit.

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



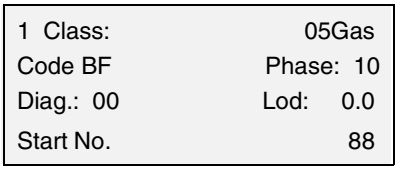
choose the desired format and cofirm by pressing ENTER; press ESC to exit.
PhysicalUnits: it allows setting the measuring units for temperature and pressure



Temperature units: °C or °F
Pressure units: bar or psi.
choose the desired unit and cofirm by pressing ENTER; press ESC to exit.

System lockout

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



call the Technical Service and tell the message data.

Cold start thermal shock (CSTP)

If there is a steam boiler that must start up cold in the plant, the fireman will heat the boiler keeping the burner at the lowest output to prevent thermal shocks.

The LMV control box provides the CSTP (Cold Start Thermal Schock) function that is already set by the Technical service (access by reserved password).

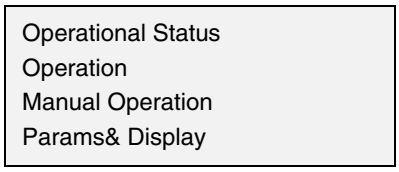
if this function is enabled, when the burner starts upthe “Thermal shock protection activated” message will be shown.

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

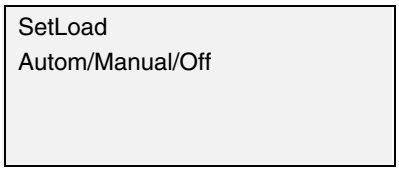
Manual mode

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

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



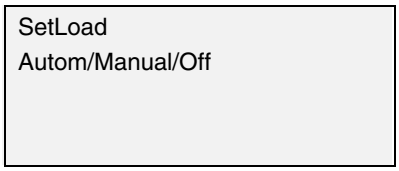
Items to be set are the fllowing:



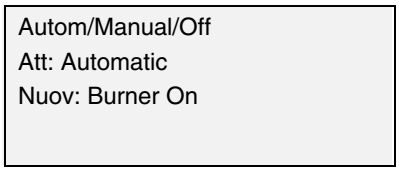
SetLoad: to set the required load percentage



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



choose “Autom/Manual/Off



three modes are provided:

Automatic: automatic operation

Burner on: manual operation

Burner off: burner in stand-by

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

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

SPARE PARTS

Desription	Code
SIEMENS LMV51.100 - 110V BURNER CONTROL	2020460
SIEMENS LMV51.100 - 230V BURNER CONTROL	2020456
SIEMENS LMV51.200 - 110V BURNER CONTROL	2020463
SIEMENS LMV51.200 - 230V BURNER CONTROL	2020457
SIEMENS LMV52.200 - 110V BURNER CONTROL	2020461
SIEMENS LMV52.200 - 230V BURNER CONTROL	2020459
SIEMENS PLL52.110 O2 PCB FOR LMV52	2022111
AZL52.00 USER INTERFACE	2022112
AZL52.09 USER INTERFACE	2022121
AGG5.220 - 220V POWER SUPPLY	2022103
AGG5.210 - 110V POWER SUPPLY	2022113
SIEMENS SQM45 ACTUATOR	2480070
SIEMENS SQM48 ACTUATOR	2480071
SIEMENS QRI2A2 IR PROBE (FRONTAL ILLUMINATION)	2510028
SIEMENS QRI2B2 IR PROBE (LATERAL ILLUMINATION)	2510027
SIEMENS AGG5.310 SPEED SENSOR	2512108
SIEMENS QGO OXYGEN PROBE	2570304



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RECOMMENDATIONS FOR LMV5x CONNECTIONS

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

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

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

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

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

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

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

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

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

Annex1 – Example for motor cable

INDUSTRIA E AUTOMAZIONE

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

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



CARATTERISTICHE TECNICHE

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

TECHNICAL FEATURES

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

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

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

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

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

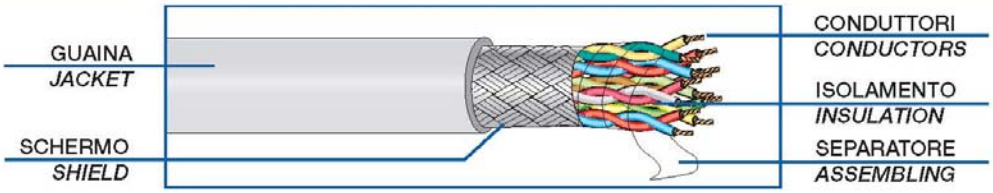
Annex 2 – Example for sensor cable

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

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

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

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



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

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

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

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



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

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



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

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



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

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

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

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

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

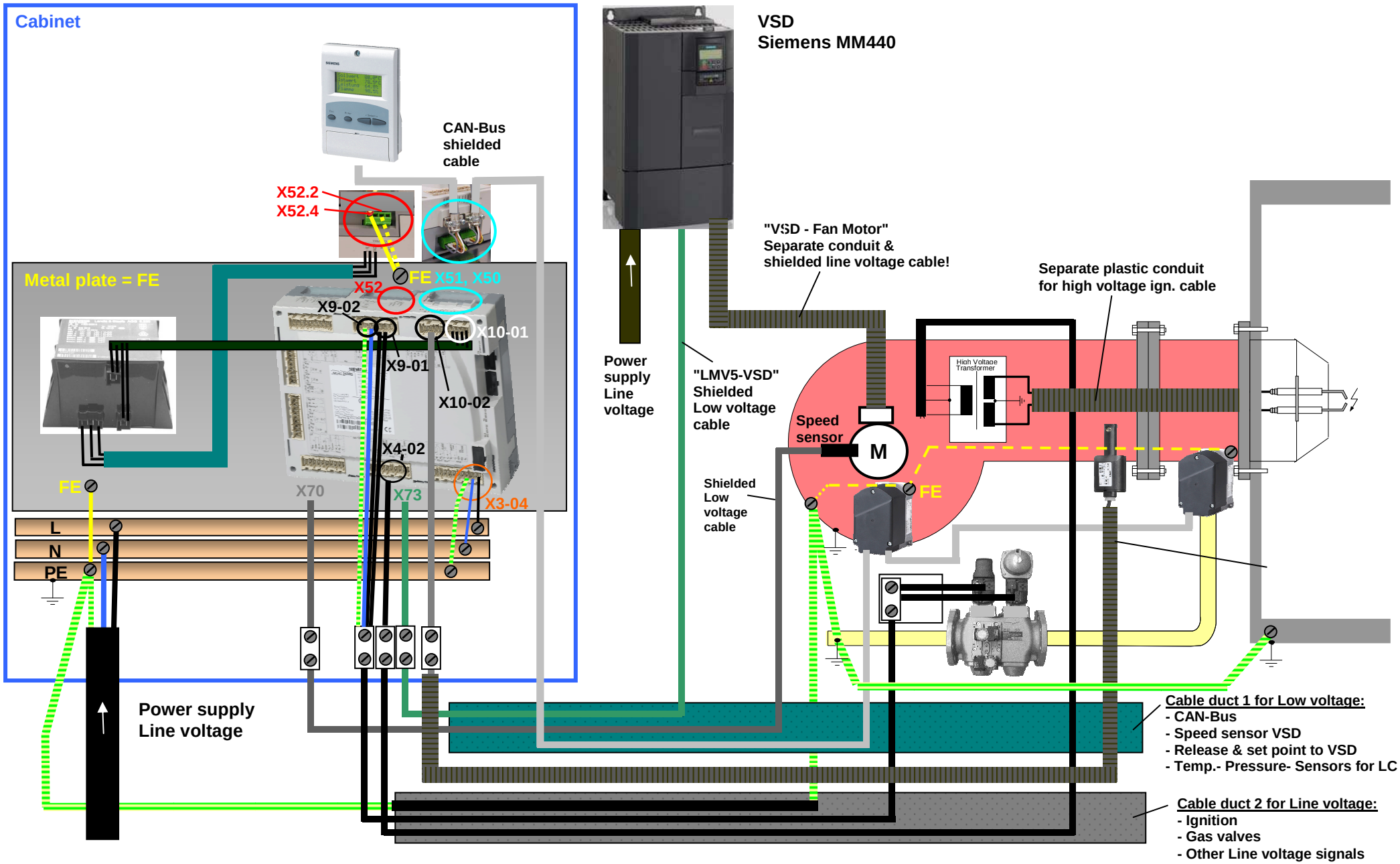
CAVI TIPO "Li-YCY-P"
A COPPIE SCHERMATI A TRECCIA

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

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

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

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



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

General

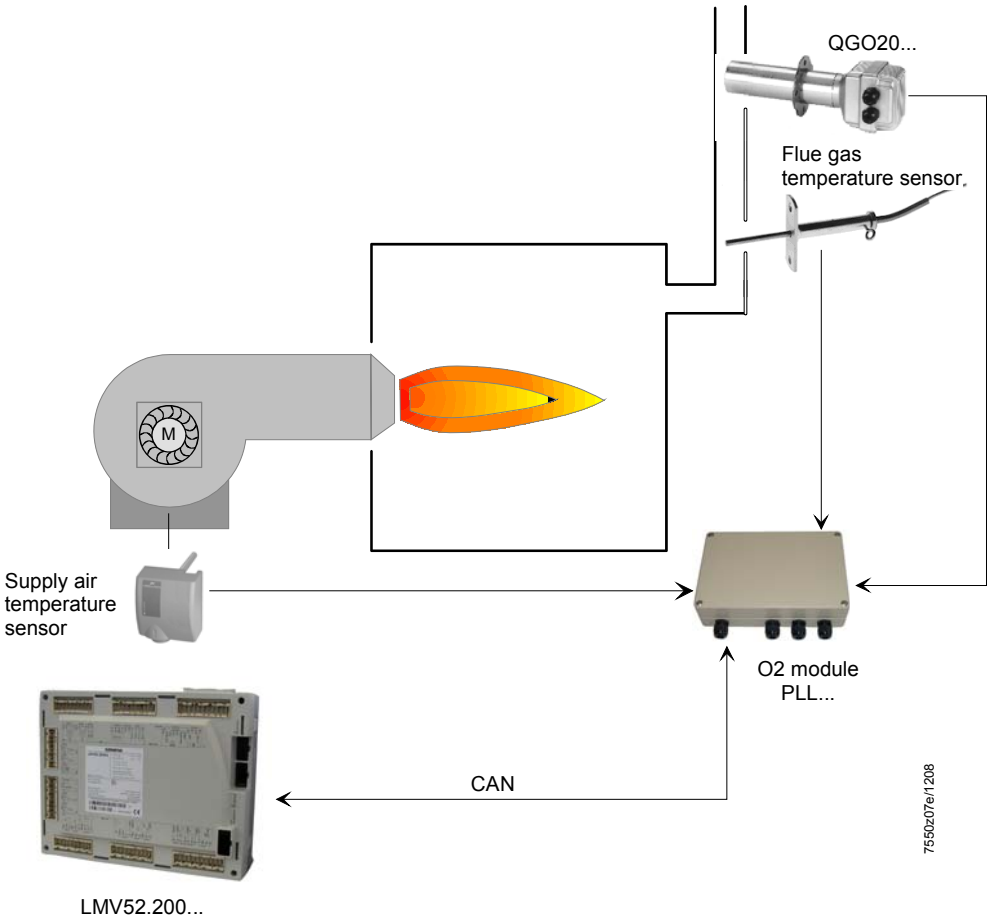
The LMV52... system is an extended LMV51... system. A special feature of the LMV52… is control of the residual oxygen content to increase the boiler's efficiency.

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

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

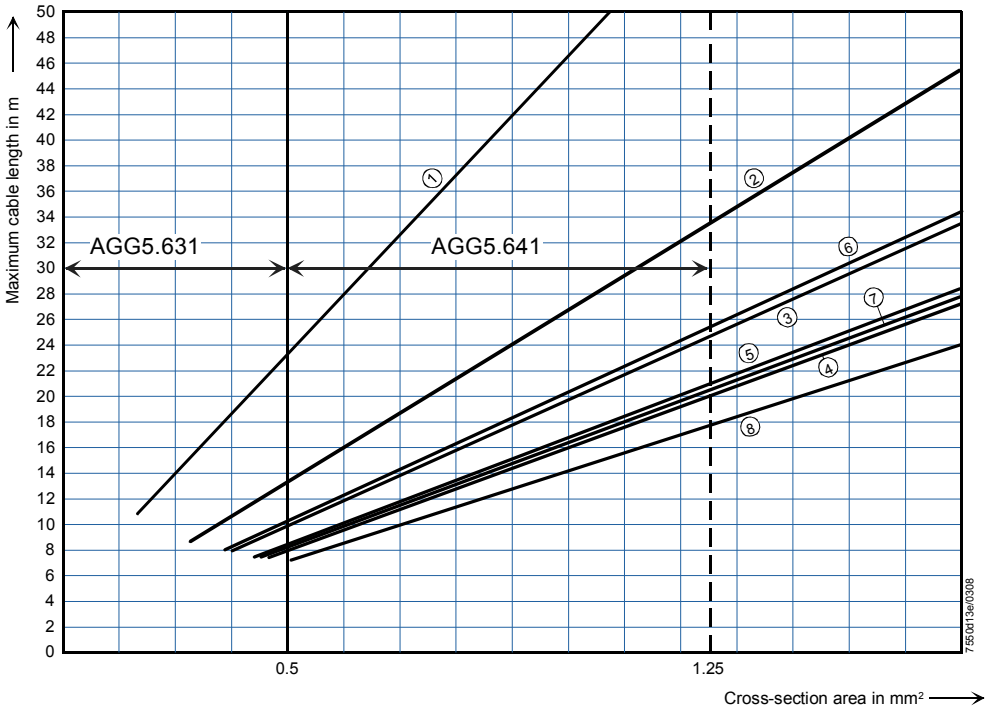
The PLL... O2 module is a detached measuring module for the QGO20... sensor and for 2 temperature sensors (Pt1000 / LG-Ni 1000). The module communicates with the LMV52… via CAN bus.

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



Determination of the maximum cable length

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



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

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

CAN bus connection between transformer and actuator group



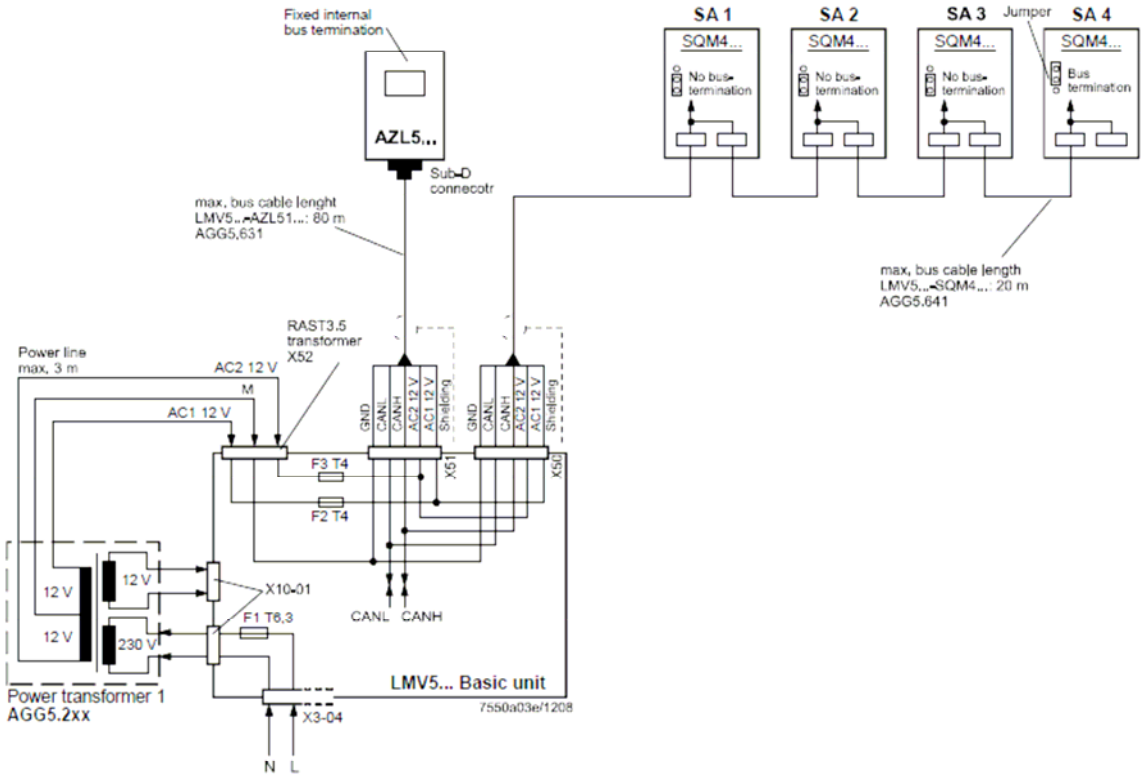
When connecting a PLL52... O2 module, the maximum permissible cable length of a network is to be reduced by 2 m.

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

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

Example 1

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

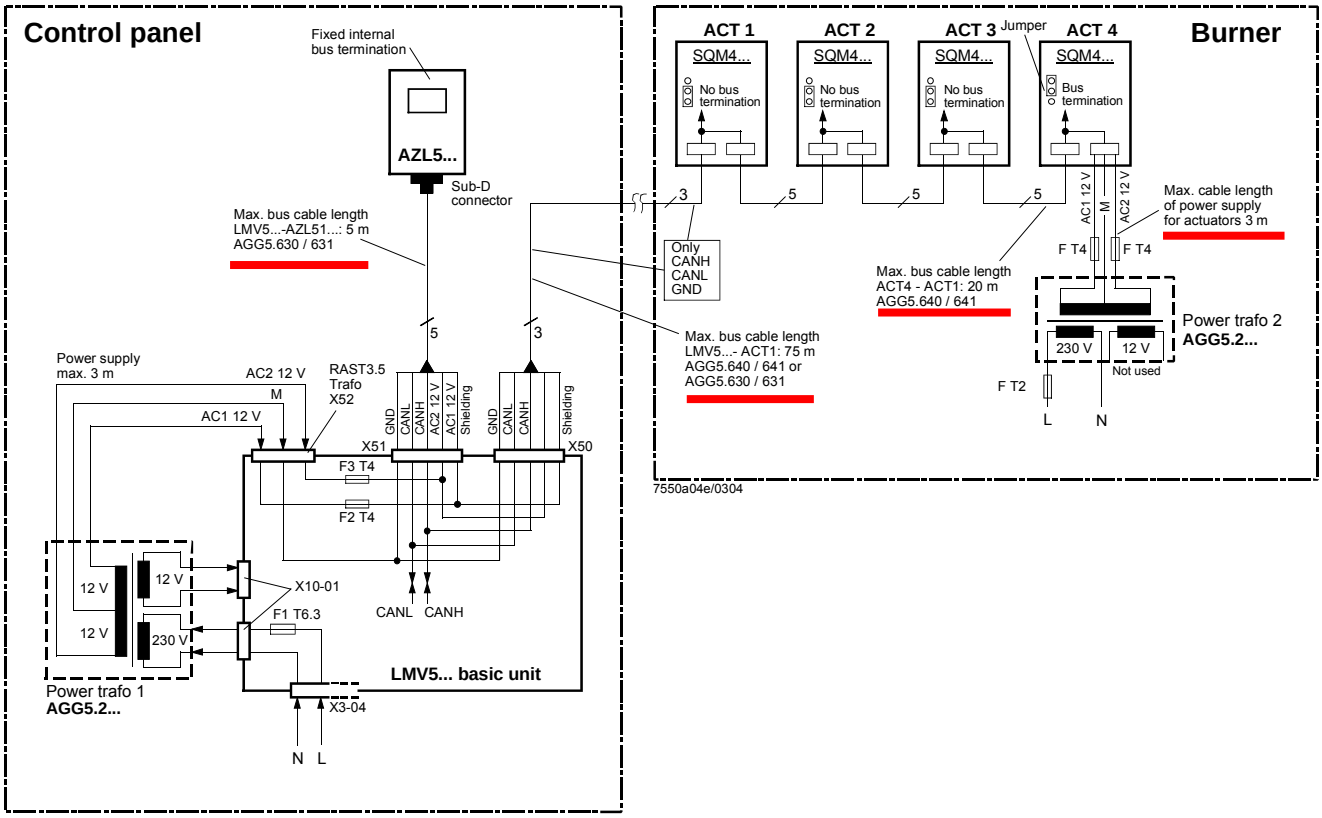


Note on example 1

Total length of CAN bus cable ≤ 100 m

Example 2

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



Notes on example 2

Total length of CAN bus cable ≤ 100 m

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

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

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

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

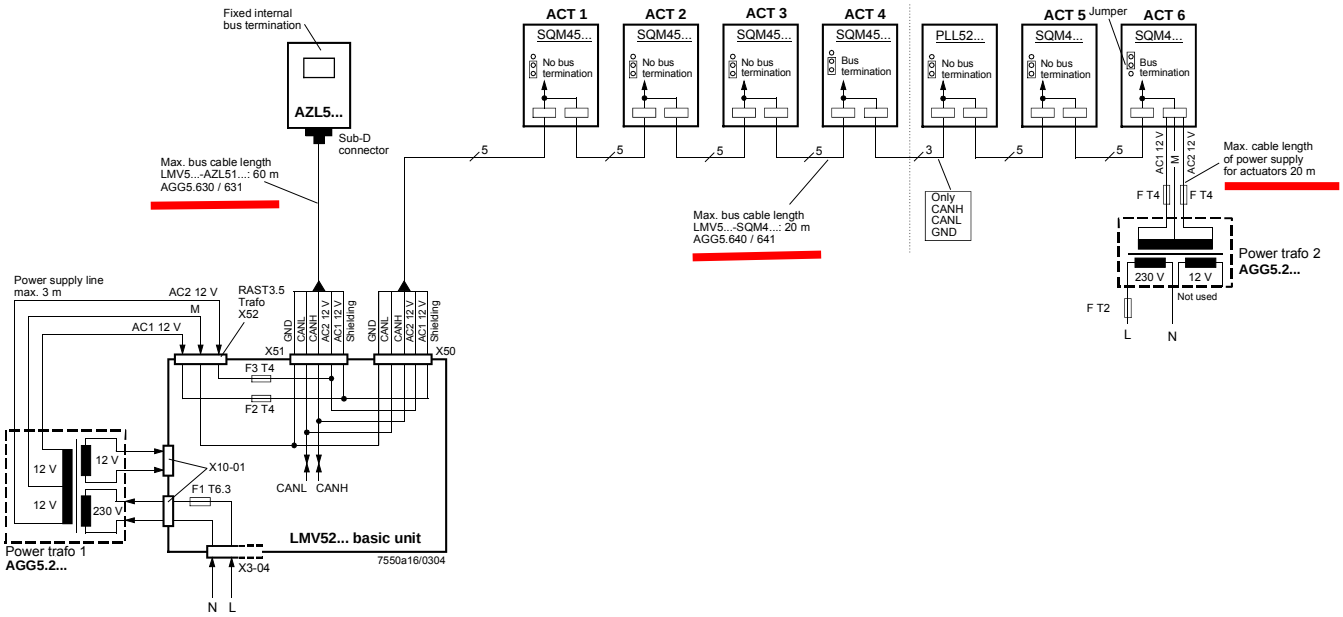
The power from that transformer (lines AC1, AC2, M) must be fed to the actuator (ACT4 in the example above) and then connected through via bus cable AGG5.640 (cable type 1) to all the other actuators.

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

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

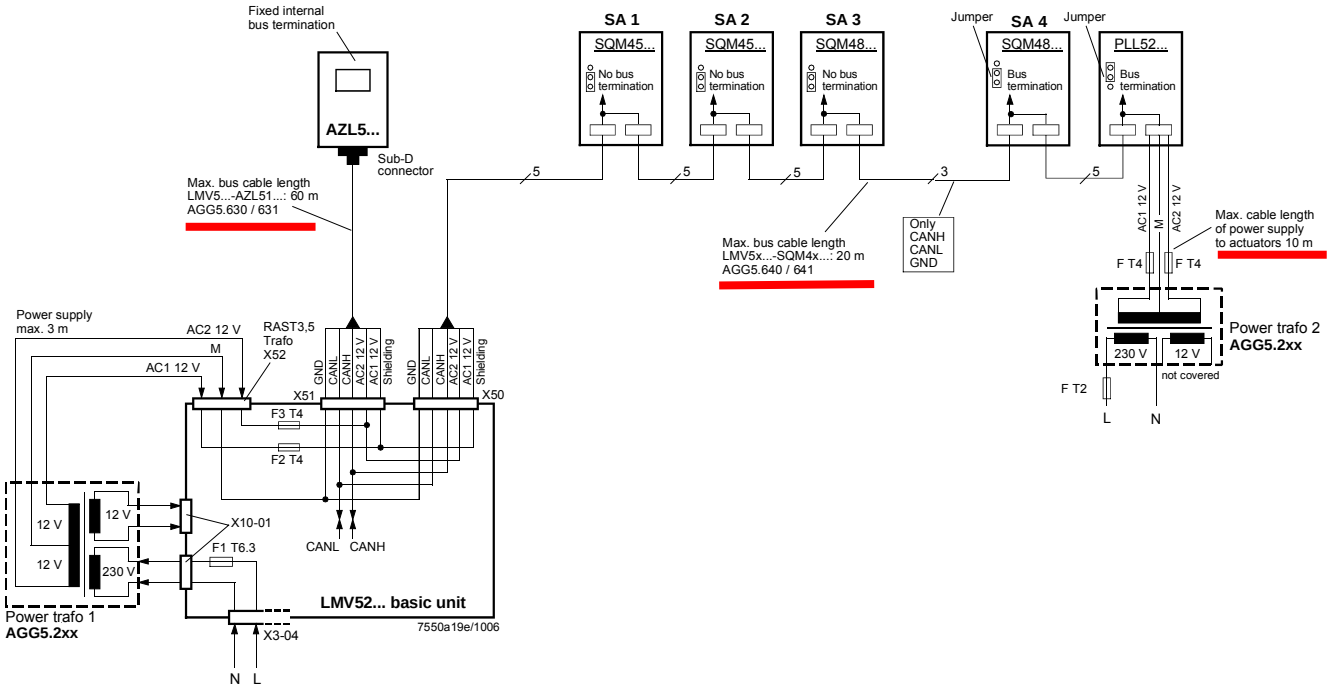
Example 3a

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



Example 3b

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



Notes on example 3a / 3b

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

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

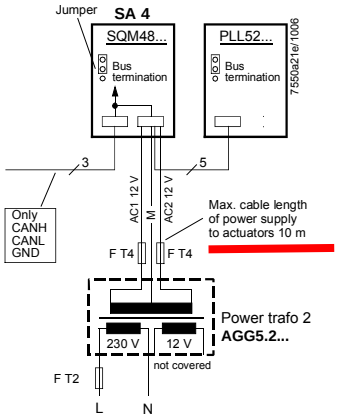
In that case, transformer 1 powers the LMV52... basic unit, the **AZL5...**, and the first 4 actuators.

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

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

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

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

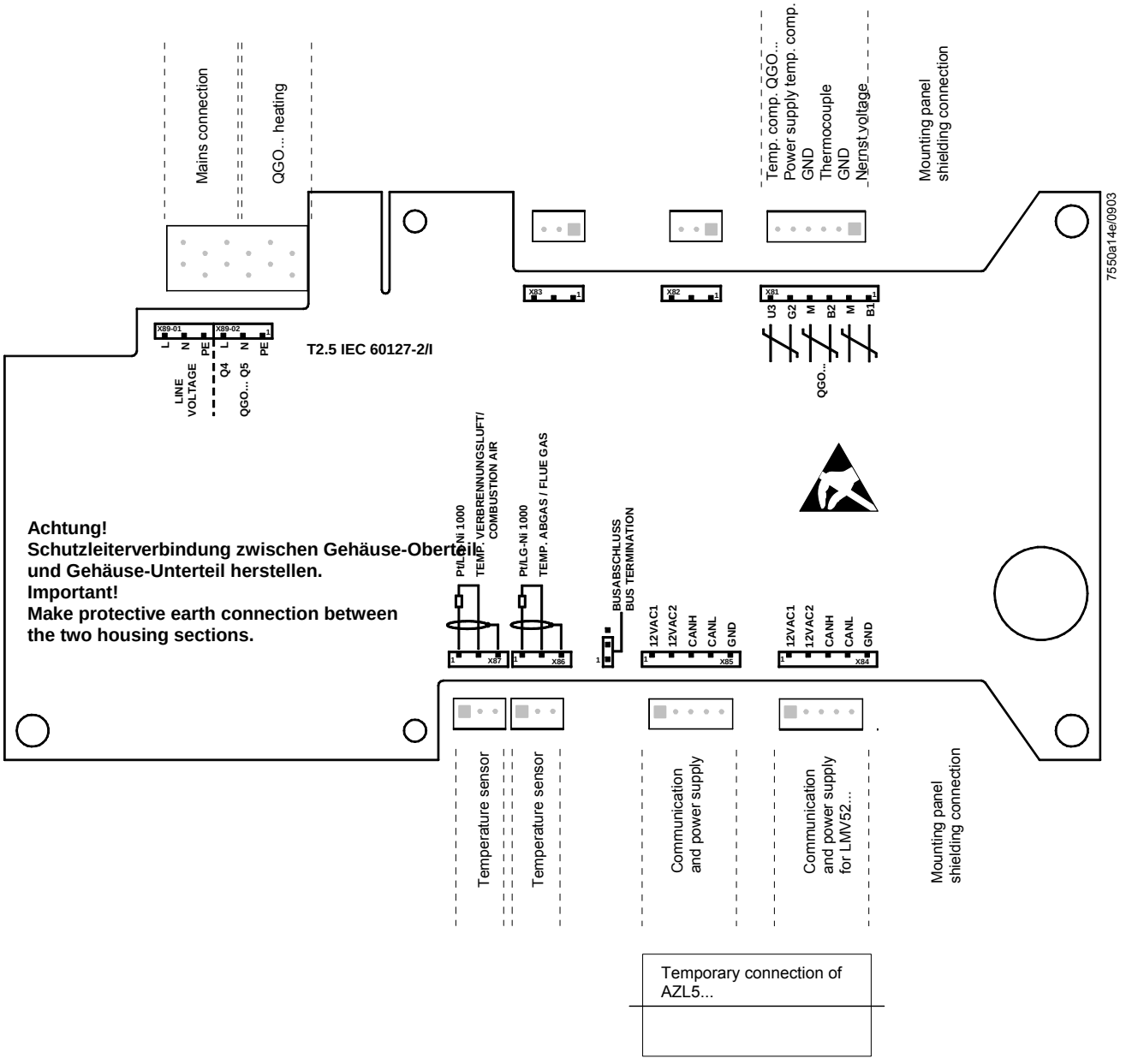


For transformer 2, the OEM must fit the 3 fuses close to the transformer.

O2 module

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

18.8.1 Inputs and outputs

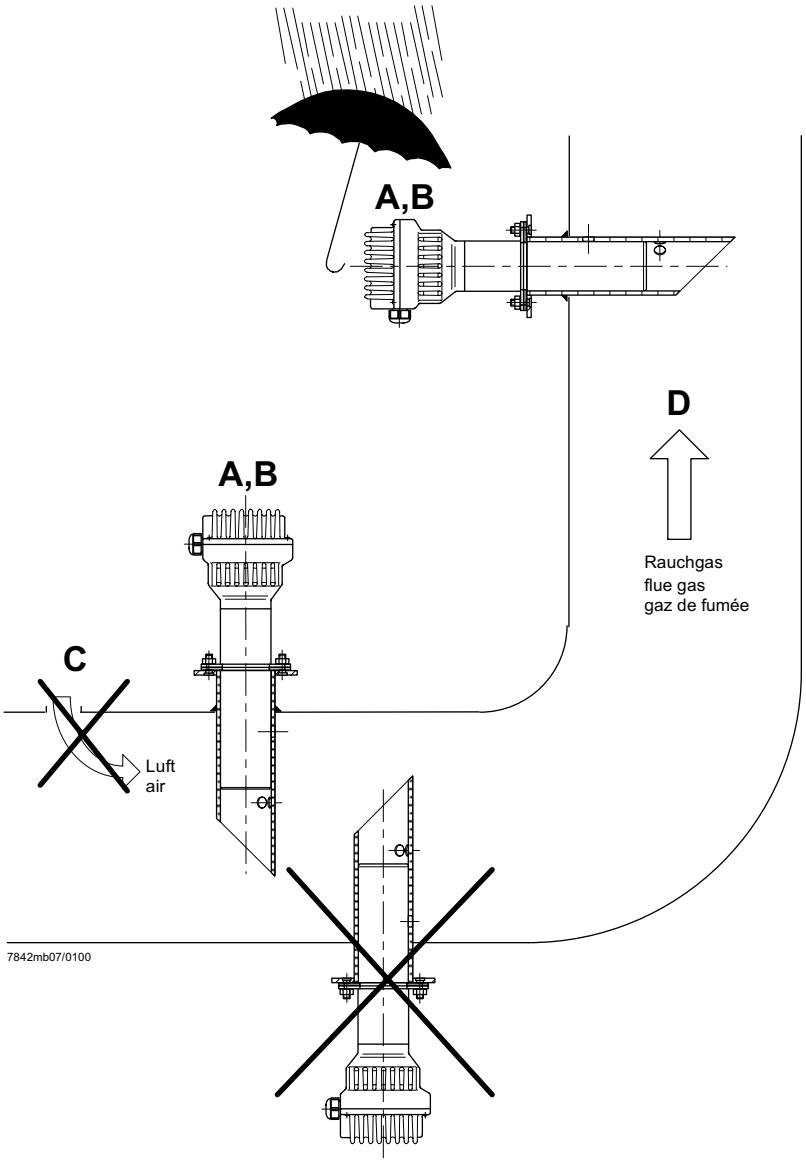


QGO20...

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



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



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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Anschluss-Schema

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

Anschlusskabel z.B.:

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

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

3 x 1,5 mm^2:

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

⏚ Erde*

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

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

Wiring diagram

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

Connecting cable e.g.:

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

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

3 x 1,5 mm^2:

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

⏚ Earth*

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

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

Schéma de raccordement

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

Câble de raccordement p.ex.:

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

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

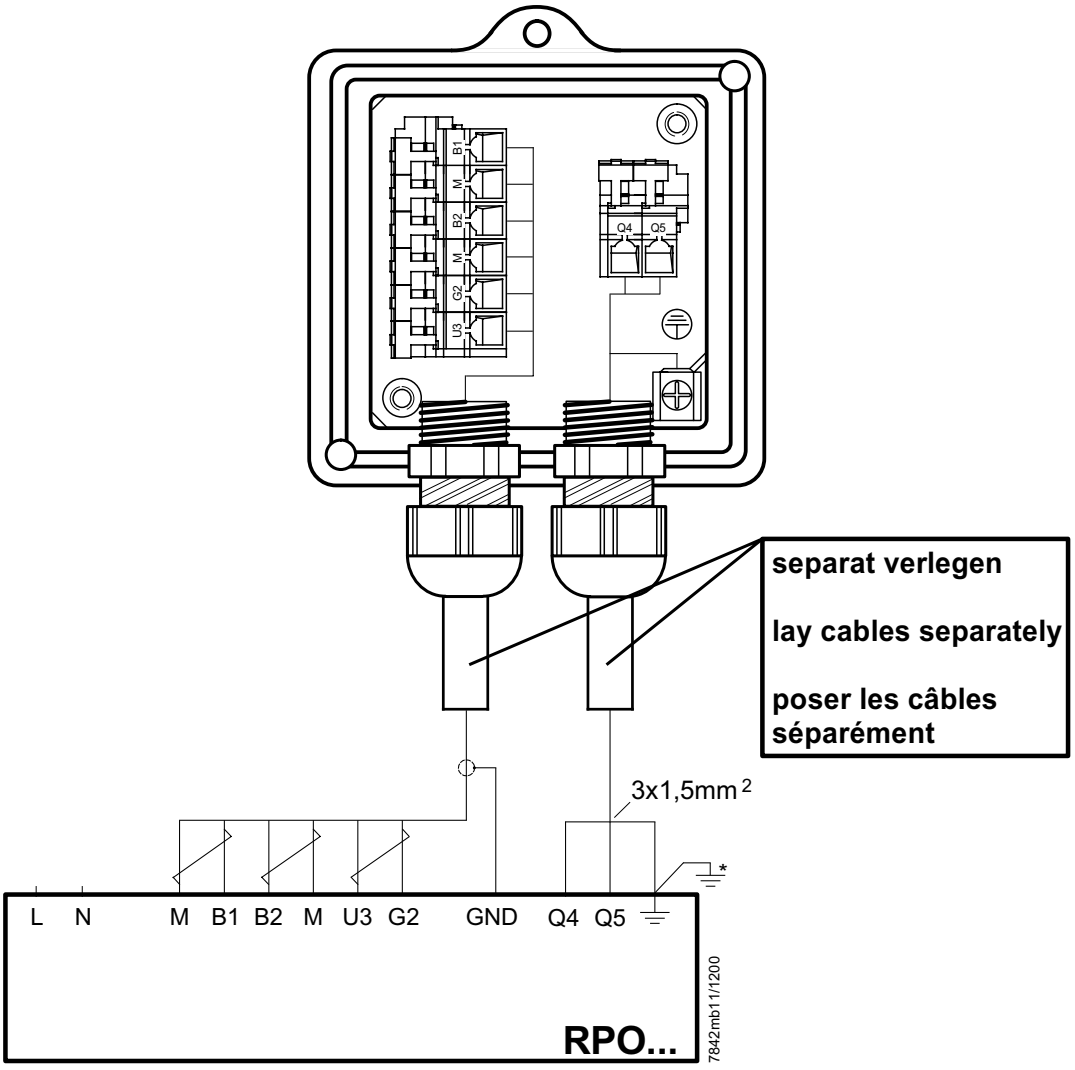
3 x 1,5 mm^2:

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

⏚ Terre*

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

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



Hinweise für Installation und Inbetriebnahme

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

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

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

- Während des Aufheizvorganges kann der Fühler falsch messen.

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

- Nach Fühlertausch, Ansteuerung der Fühlerheizung überprüfen.

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

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

Commissioning and Installation Guide

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

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

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

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

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

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

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

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

Instructions de mise en service et installation

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

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

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

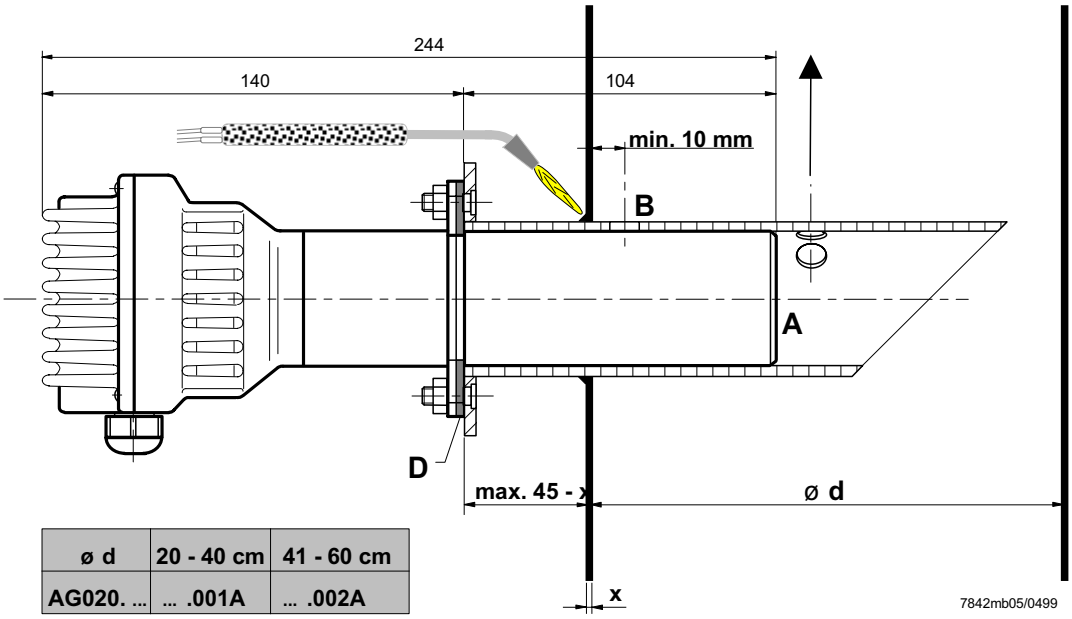
- Pendant l´operation d´échauffement, il est possible que la sonde ne mesure pas correctement.

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

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

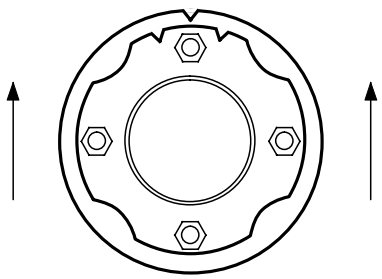
- Les tensions aux bornes Q4 - Q5 <u>doivent</u> commuter toutes les 2 s.

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



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

Kerben beachten!
Observe notches!
Attention aux entailles!



7842mb06/0499

Legende:

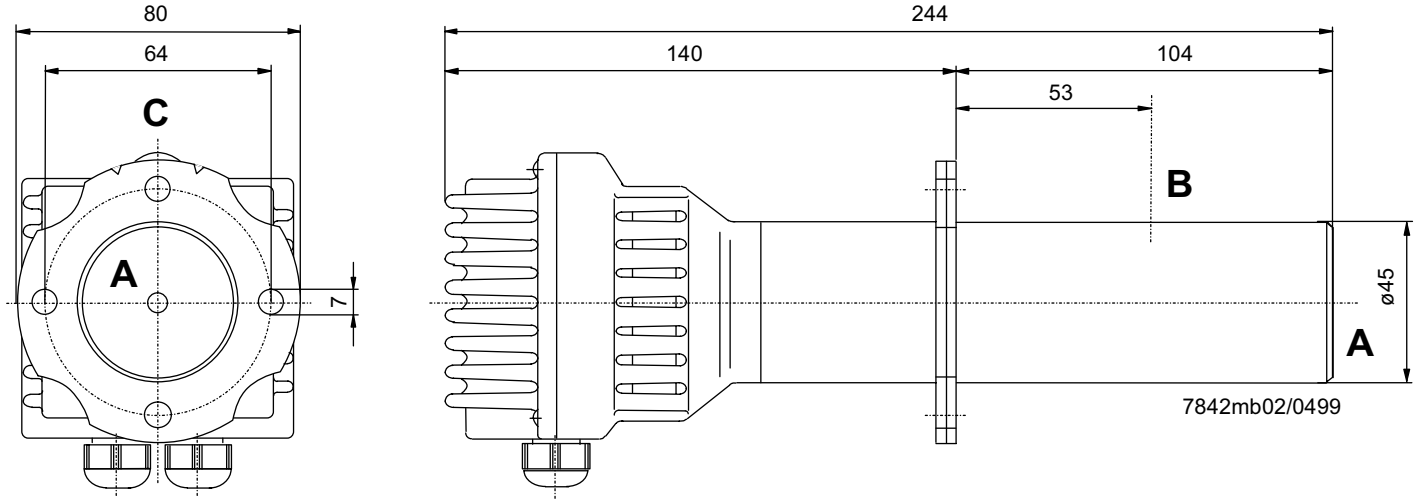
Strömungsrichtung

Direction of flow of flue gases

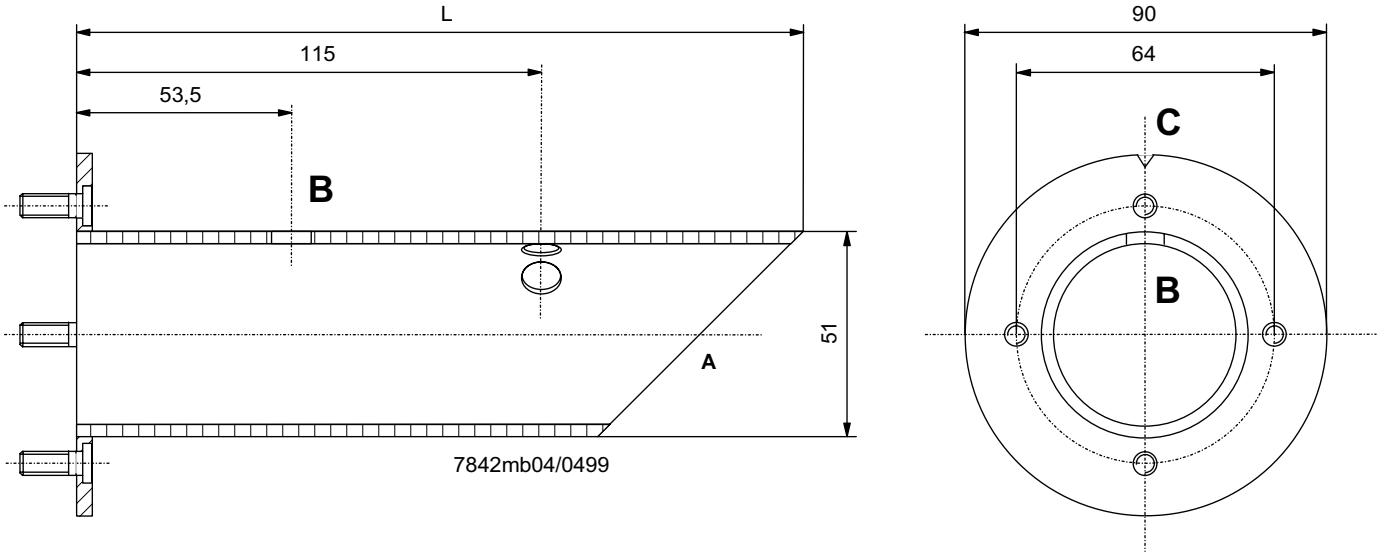
Direction du courant des gaz de fumée

Maßbilder / Dimensions / Encombrements

QGO20...



AGO20...



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

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

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

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

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

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

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Technical Data PLL52...

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

PLL52...

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

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

Environmental conditions

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

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

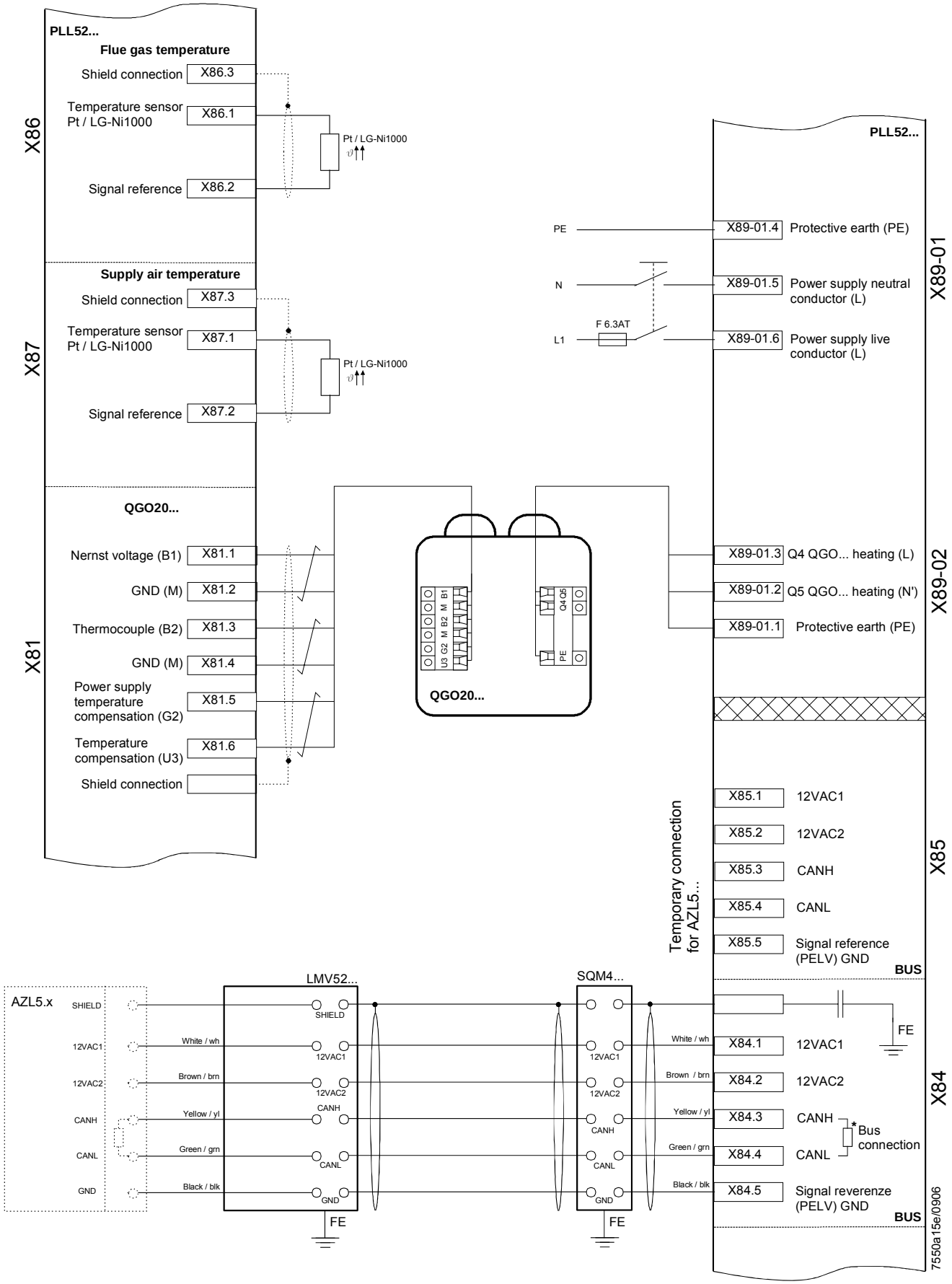
Terminal ratings, cable lengths and cross-sectional areas

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

PLL52...

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

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

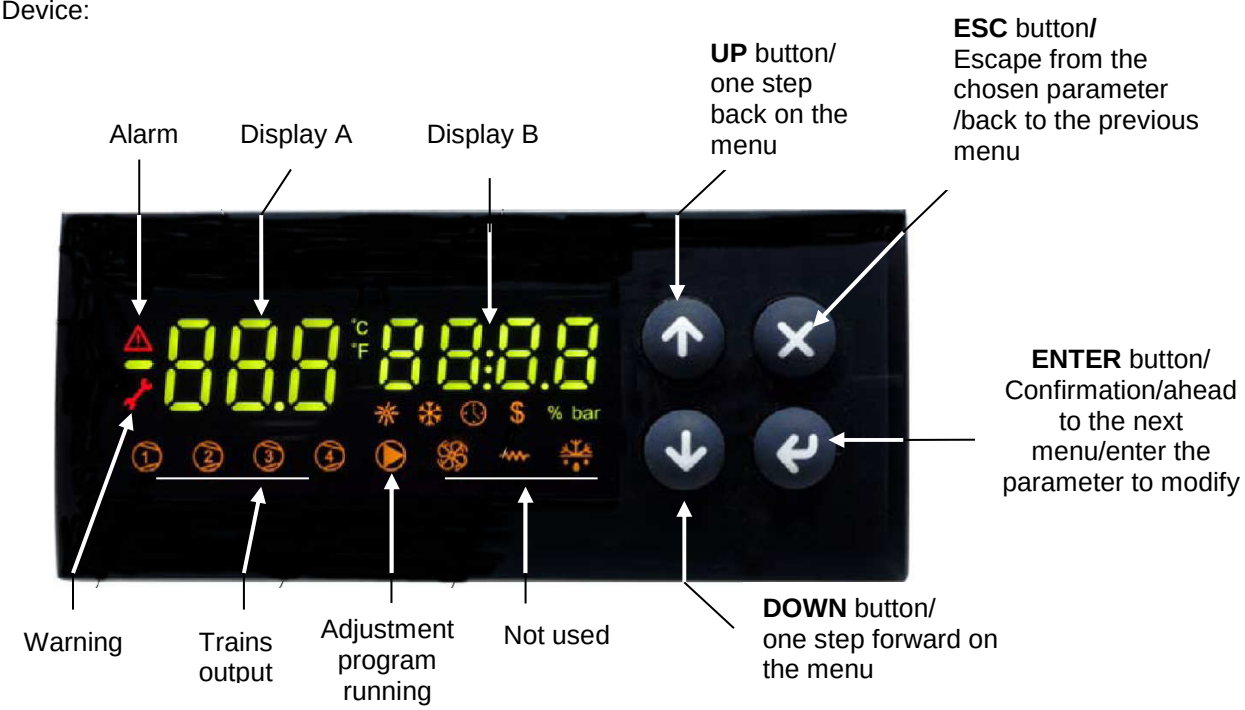

PLL52...
Flue gas temperature
Shield connection
X86.3
Temperature sensor Pt / LG-Ni1000
X86.1
Pt / LG-Ni1000
Signal reference
X86.2
X86
Supply air temperature
Shield connection
X87.3
Temperature sensor Pt / LG-Ni1000
X87.1
Pt / LG-Ni1000
Signal reference
X87.2
X87
QGO20...
Nernst voltage (B1)
X81.1
GND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

USER MANUAL OF MULTI-THERMOSTAT

MCX06C

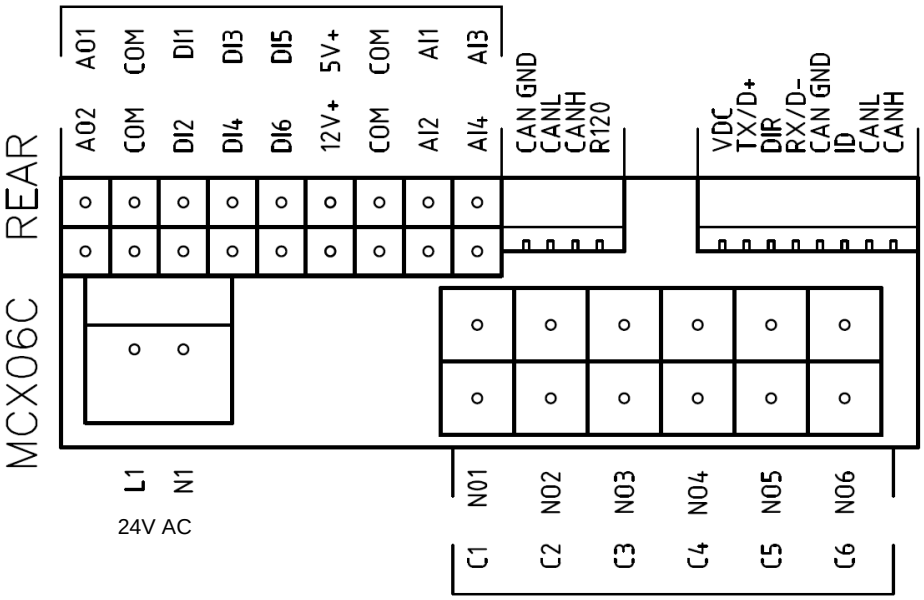
MCX06C is a multi-thermostat with four 100k NTC inputs. It can control up to 4 temperatures showing them (not more than 2 at the same time) on a couple of displays.
It is used to check and adjust oil heater temperatures.

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:

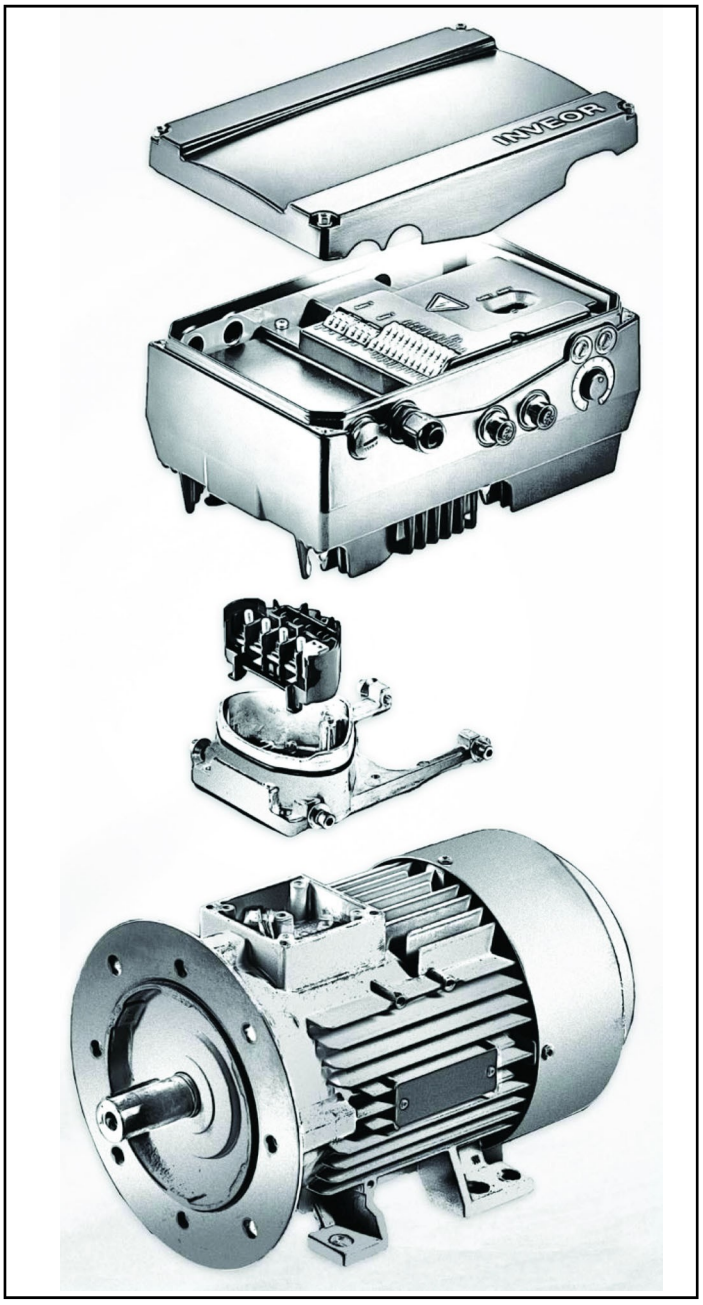
Menu path				Oil viscosity at 50 °C according to the letter show n in the burner model				
				P	**N**	**E**	**D**	**H**
				89 cSt	< 50 cSt	> 50 cSt < 110 cSt	> 110 cSt < 400 cSt	> 400 cSt < 4000 cSt
				12 °E	< 7°E	> 7 °E < 15 °E	> 15 °E < 50 °E	> 50 °E < 530 °E
Par								
rEG	Pb1	tr	Oil heater temperature 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.

KOSTAL INVERTER

Connection and programming
for electronically controlled burners with

LMV2x/3x, LMV5x, ETAMATIC
and INVERTER regulation



Service Manual
TECHNICAL
INSTRUCTIONS

M12938CA - Rel. 0 - 10/2021

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Burner terminal with INVERTER interface, 16

IDENTIFICAZIONE INVERTER

INVEOR Mx IVxx PWxx LPxx APxx GHxx DKxx COxx 1

1 2 3 4 5 6 7 8 9 10

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

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

INVEOR M INVERTER SIZES

TAGLIE
INVERTER INVEOR M...



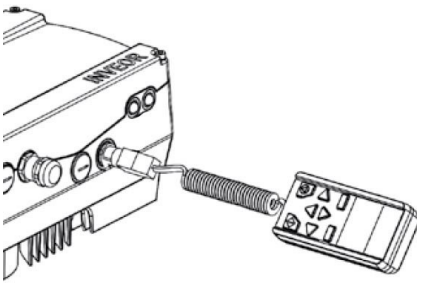
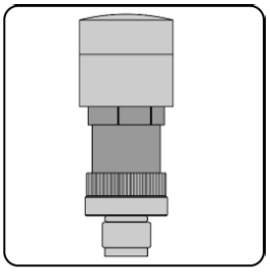
α ***A*** ***B*** ***C*** ***D***

User interface

COMMUNICATION (on request)

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

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

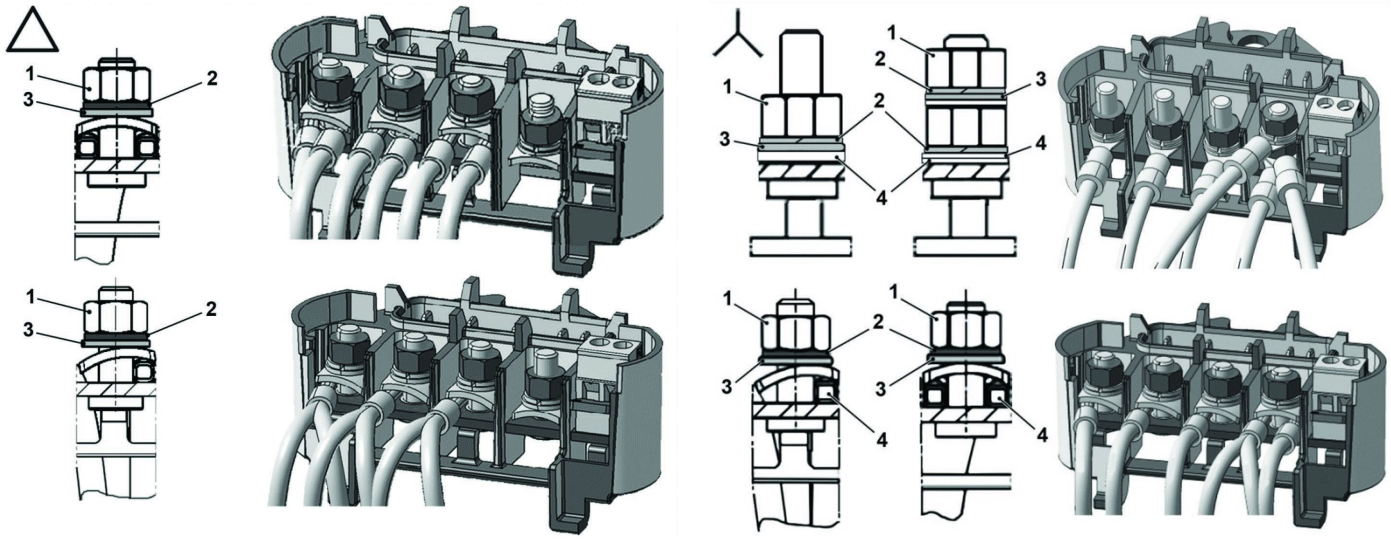
USB adaptor for PC	
Via the INVERTER PC software	
	
INVEOR MMI remote display:	
INVEOR MMI is a portable display on which all inverter parameters can be viewed and changed. Manual available on the KOSTAL website.	
Bluetooth connection:	
Using the Bluetooth adaptor you can connect via app from any device.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

ELECTRICAL CONNECTIONS

Motor connection variants for INVERTERS sizes A, B and C

Star or delta connection for speed controller integrated on the motor

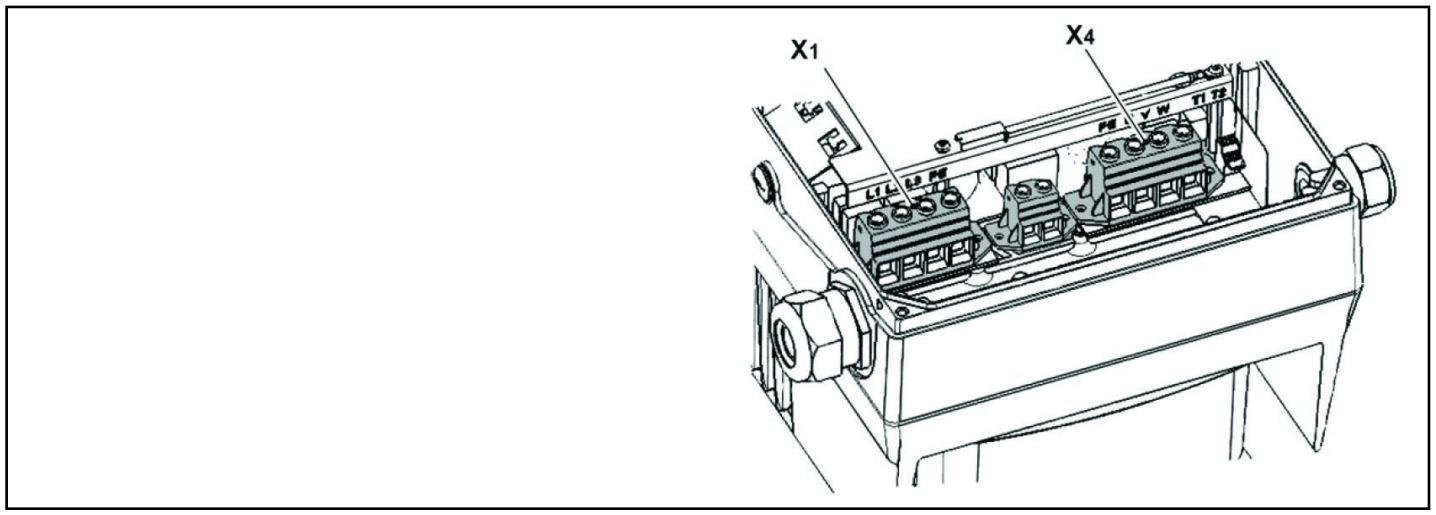
Delta connection variant ***Star connection variant***



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

Fig. 1

Motor connection variants for INVERTER size D



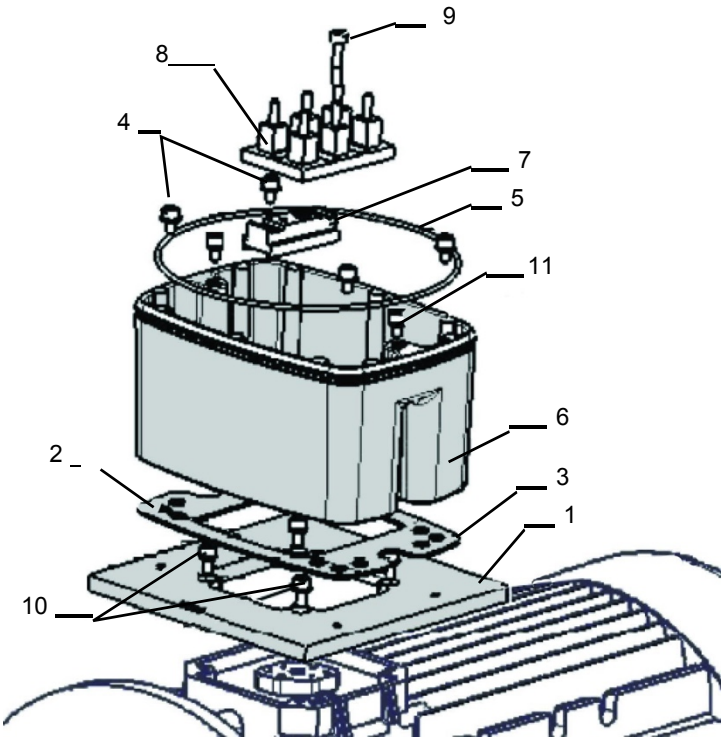
X1 terminal no.	Designation	Assignment
1	L1	Mains phase 1
2	L2	Mains phase 2
3	L3	Mains phase 3
4	PE	Protective conductor

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

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

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

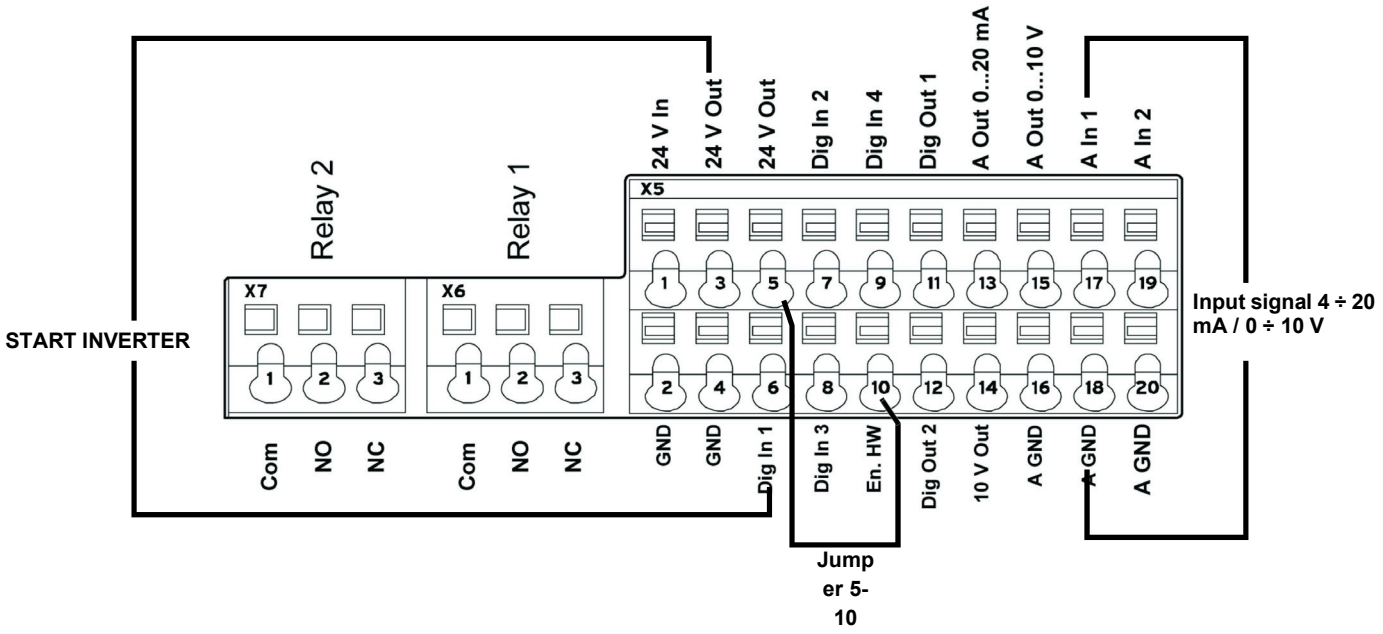
Fig. 2 – Assembly sequence: Connection box – adapter plate size D



Key:

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

Connection of INVERTER signals and commands

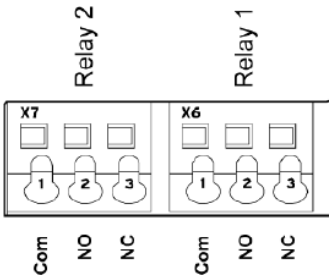


Electrical connections and parameter configuration

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

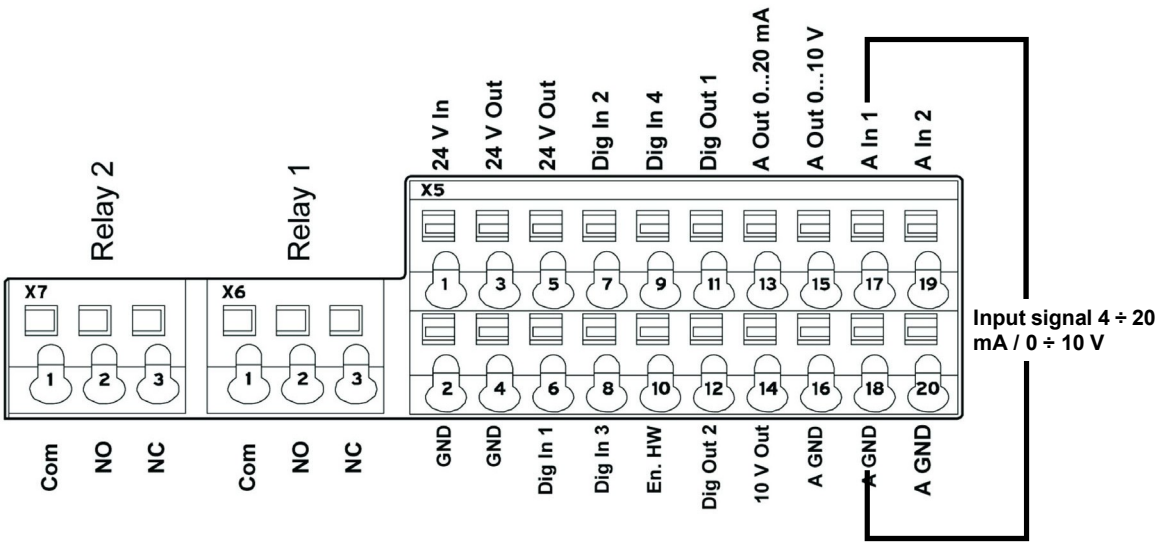
LMV2/3x: Relay 1 is used as a safety contact on the safety loop series of the equipment. Relay 2 is used as a fault indicator on the burner panel front.

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



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

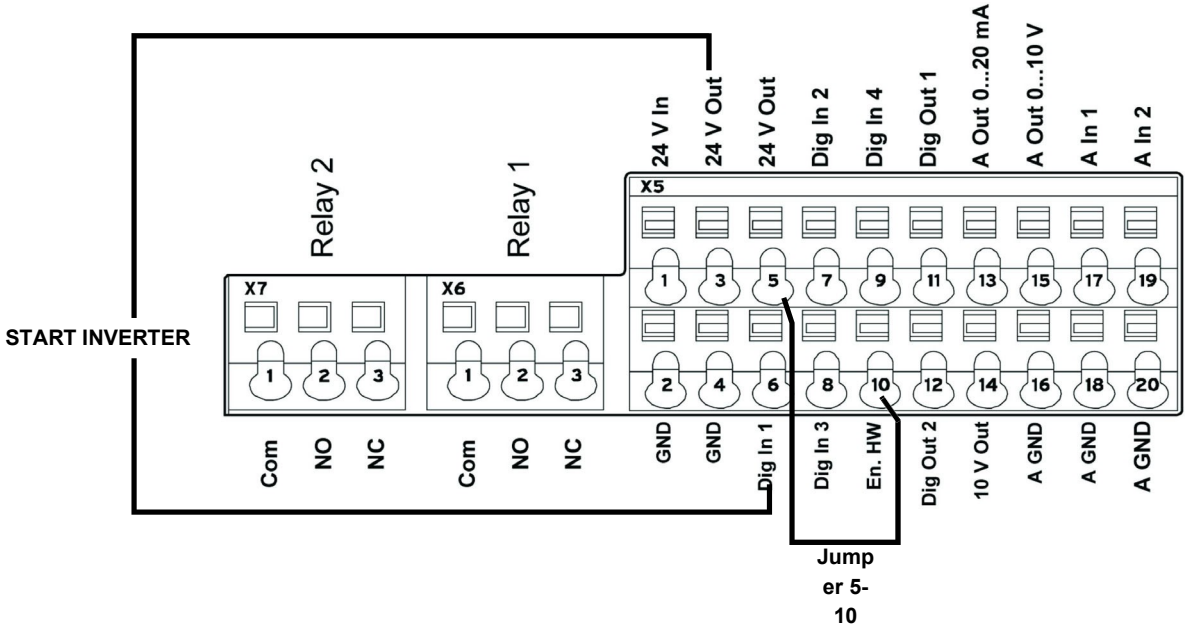
0-10V / 4-20mA analogue input configuration



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

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

Configuration of control contact / INVERTER starting and stopping



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

Configuration of INVERTER start / stop parameters and operating mode

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

Motor data

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

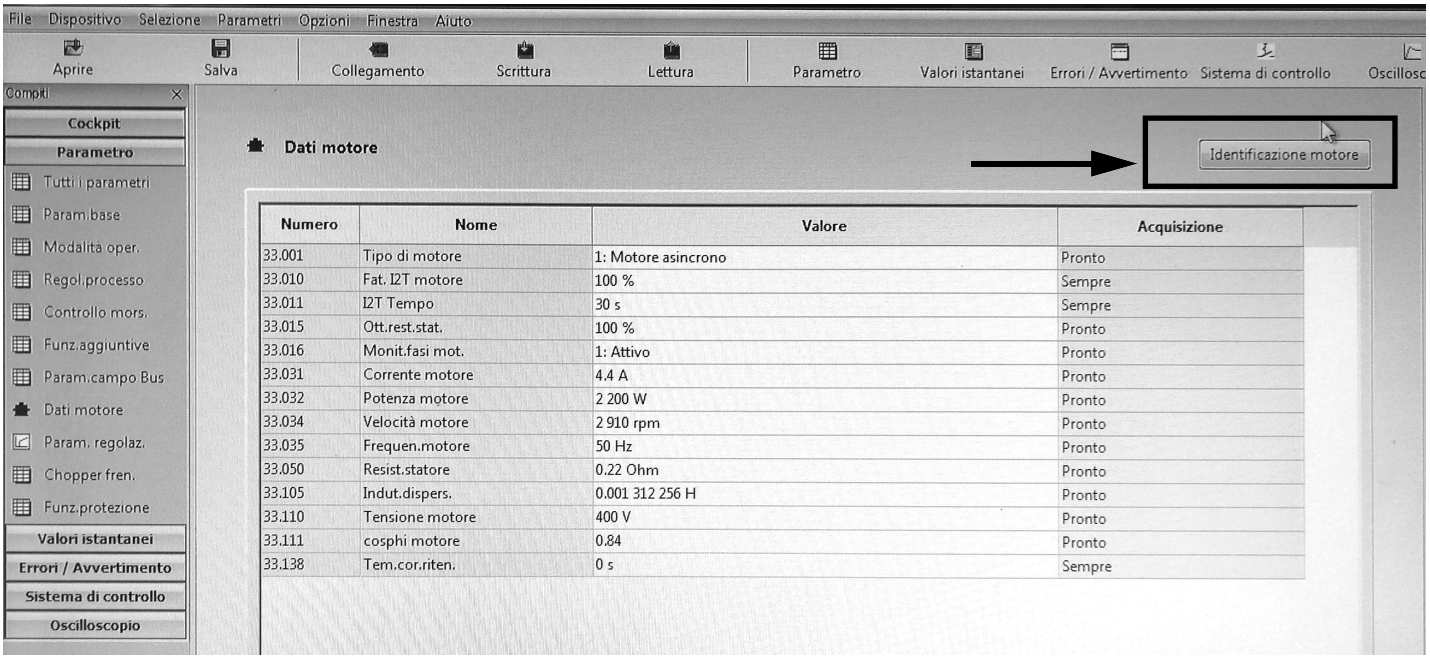
- Enter the motor data;
- Activate the motor recognition function;
- If the operation ends successfully, enter the remaining parameters.

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

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

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

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



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

Output signal variant for reading motor rpm (optional)

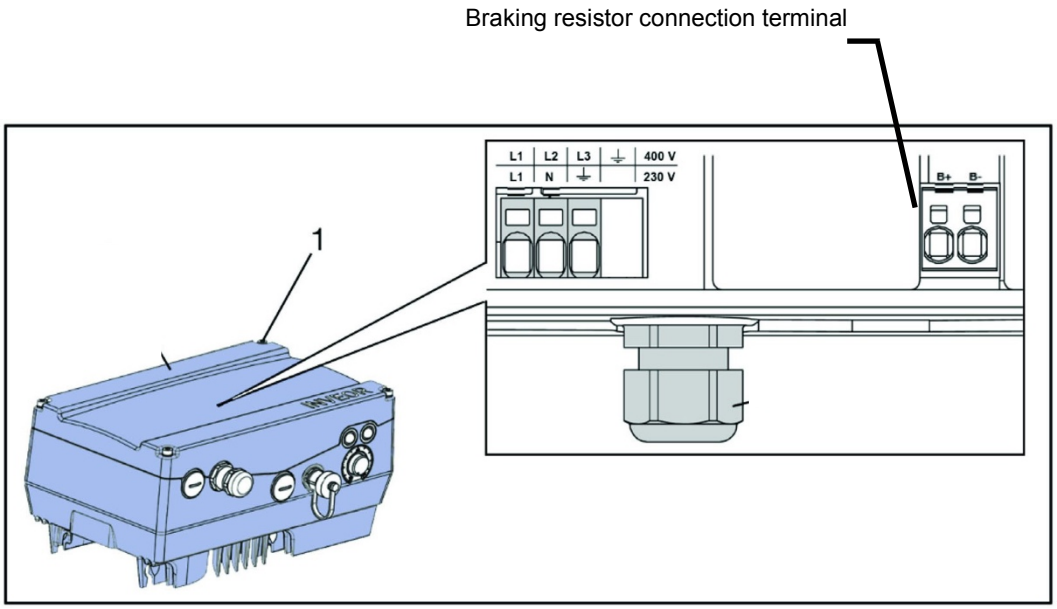
To have a 4-20 mA analogue output that indicates the motor rpm to the terminals X5-13 (Aout 0-20 mA) and X5-16 (A GND), set the parameters below:

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

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

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

Brake chopper connections



Brake chopper connections

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

Optional assignment of brake chopper

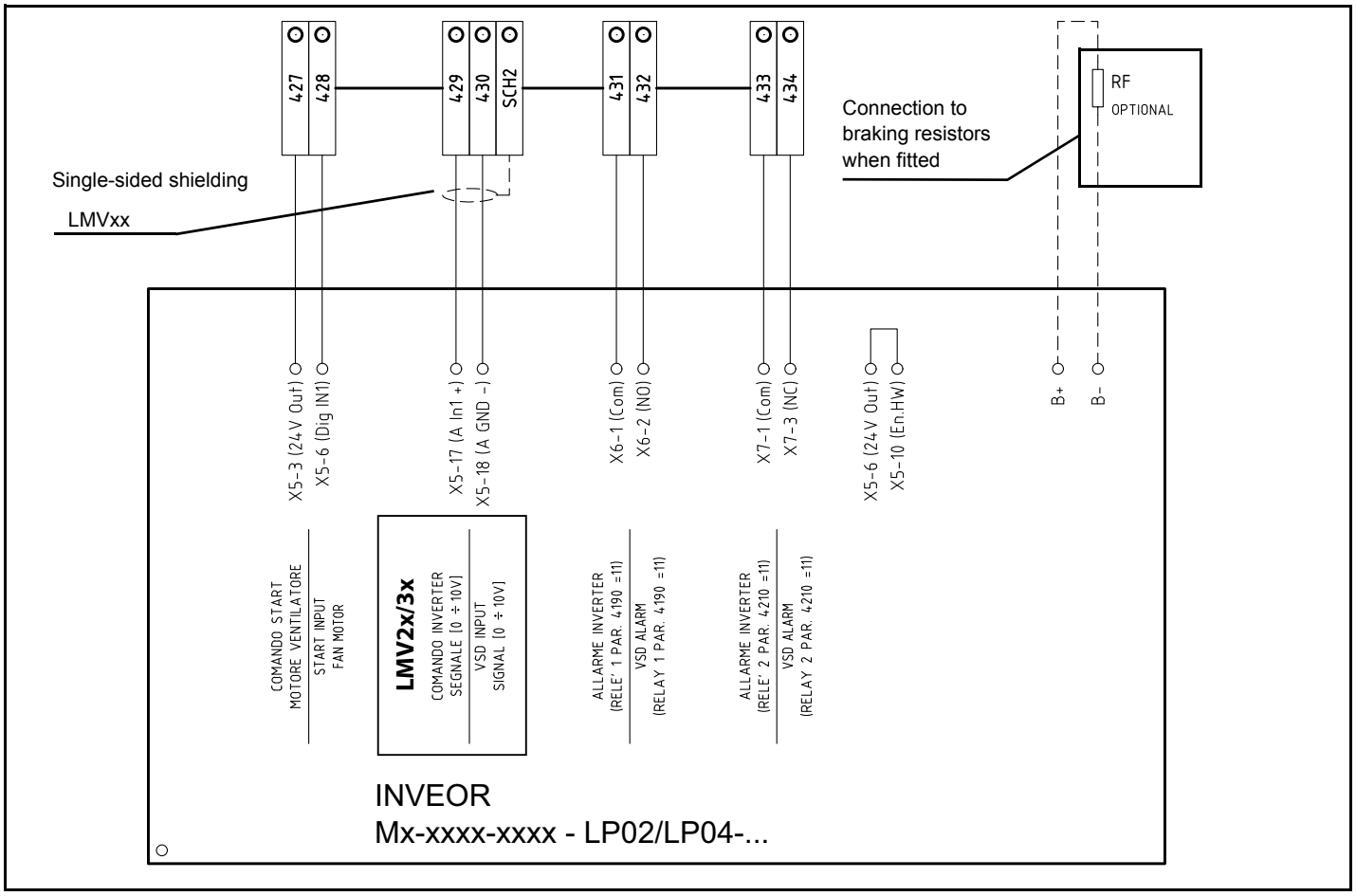
Parameter	
Braking resistor	Enabled or disabled

Braking resistors

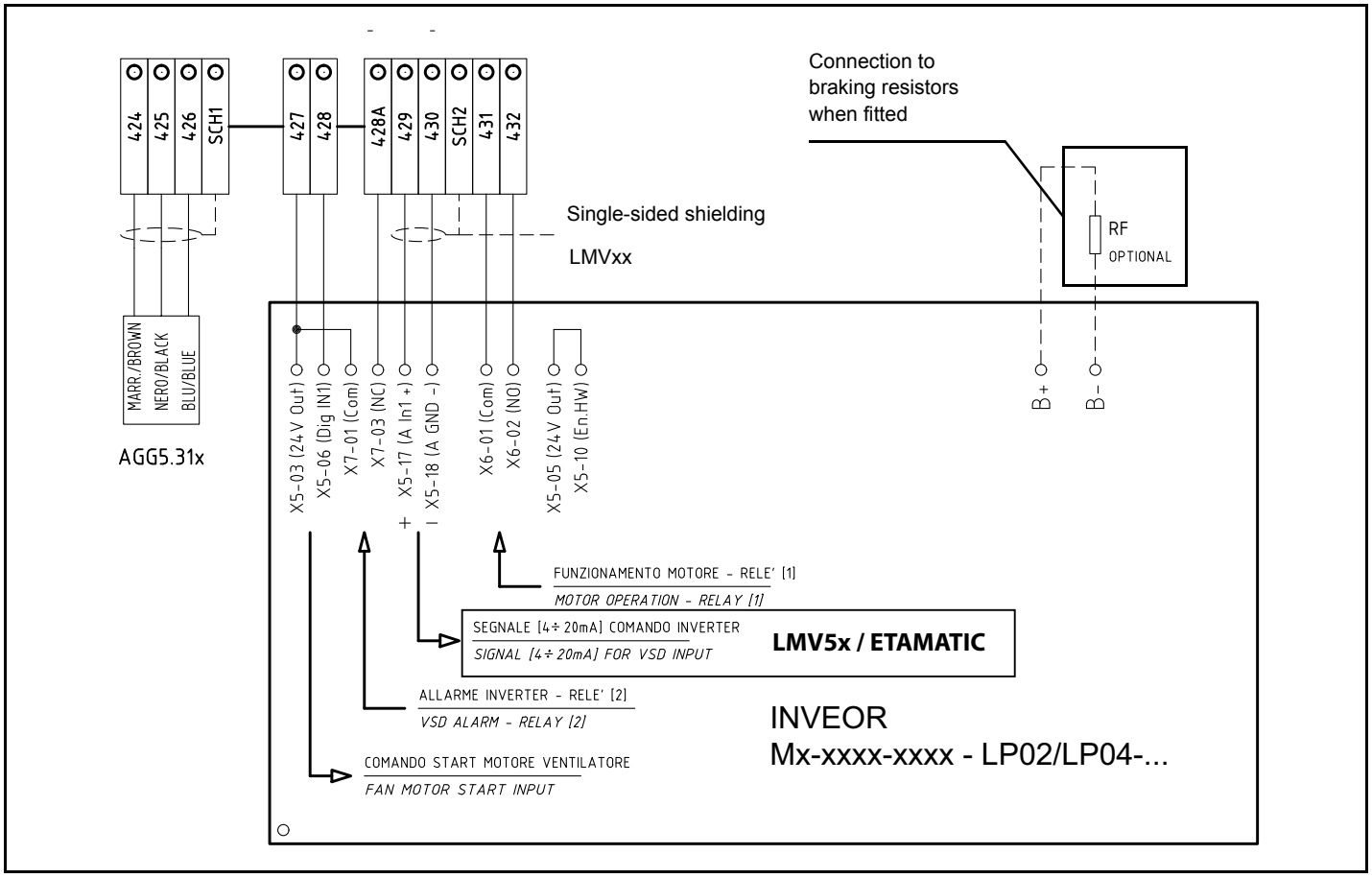


Burner terminal block with interface INVERTER

Versioni bruciatore con LMV2x/3x



Versioni bruciatore con LMV5x o ETAMATIC



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