



BURNERS
BRULEURS
BRENNER
QUEMADORES
BRUCIATORI

MANUAL OF - INSTALLATION - OPERATION - MAINTENANCE

DUAL FUEL BURNERS GAS - LIGHT OIL

HS5
HS10
HS18

M039118CA Rev. 0 04/03



Complying with
90 / 396 / CEE
GAS DIRECTIVE

NOTICES

THIS MANUAL IS SUPPLIED AS AN INTEGRAL AND ESSENTIAL PART OF THE PRODUCT AND MUST BE DELIVERED TO THE USER.

INFORMATION INCLUDED IN THIS SECTION ARE DEDICATED BOTH TO THE USER AND TO PERSONNEL FOLLOWING PRODUCT INSTALLATION AND MAINTENANCE.

THE USER WILL FIND FURTHER INFORMATION ABOUT OPERATING AND USE RESTRICTIONS, IN THE SECOND SECTION OF THIS MANUAL. WE HIGHLY RECOMMEND TO READ IT.

CAREFULLY KEEP THIS MANUAL FOR FUTURE REFERENCE.

1) GENERAL INTRODUCTION

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

In case of any doubt, do not use the unit - contact the supplier. The packaging materials (wooden crate, nails, fastening devices, plastic bags, foamed polystyrene, etc), should not be left within the reach of children, as they may prove harmful.

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

Contact qualified personnel only.

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

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

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

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

The manufacturer shall not be held liable, by agreement or otherwise, for damages resulting from improper installation, use and failure to comply with the instructions supplied by the manufacturer.

2) SPECIAL INSTRUCTIONS FOR BURNERS

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

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

- a) Remove the power supply by disconnecting the power cord from the mains.
- b) Disconnect the fuel supply by means of the hand-operated shut-off valve and remove the control handwheels from their spindles.

Special warnings

- Make sure that the burner has, on installation, been firmly secured to the appliance, so that the flame is generated inside the appliance firebox.
- Before the burner is started and, thereafter, at least once a year, have qualified personnel perform the following operations:
 - a) set the burner fuel flow rate depending on the heat input of the appliance;
 - b) set the flow rate of the combustion-supporting air to obtain a combustion efficiency level at least equal to the lower level required by the regulations in force;
 - c) check the unit operation for proper combustion, to avoid any harmful or polluting unburnt gases in excess of the limits permitted by the regulations in force;
 - d) make sure that control and safety devices are operating properly;
 - e) make sure that exhaust ducts intended to discharge the products of combustion are operating properly;
 - f) on completion of setting and adjustment operations, make sure that all mechanical locking devices of controls have been duly tightened;
 - g) make sure that a copy of the burner use and maintenance instructions is available in the boiler room.
- In case of repeated burner shut-downs, do not continue re-setting the unit manually. Contact qualified personnel to take care of such defects.
- The unit shall be operated and serviced by qualified personnel only, in compliance with the regulations in force.

3) GENERAL INSTRUCTIONS DEPENDING ON FUEL USED

3a) ELECTRICAL CONNECTION

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

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

GENERAL

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

SPECIAL INSTRUCTIONS FOR USING GAS

Have qualified personnel inspect the installation to ensure that:

- a) the gas delivery line and train are in compliance with the regulations and provisions in force;
- b) all gas connections are tight;
- c) the boiler room ventilation openings are such that they ensure the air supply flow required by the current regulations, and in any case are sufficient for proper combustion.
- Do not use gas pipes to earth electrical equipment.
- Never leave the burner connected when not in use. Always shut the gas valve off.
- In case of prolonged absence of the user, the main gas delivery valve to the burner should be shut off.

Precautions if you can smell gas

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

PART I: INSTALLATION MANUAL

SPECIFICATIONS

BURNER MODEL		HS5	HS10	HS18
Output	min. kW	35	65	80
	max. kW	70	140	200
Fuel		Natural gas Light oil	Natural gas Light oil	Natural gas Light oil
Category		I _{2H}	I _{2H}	I _{2H}
Gas rate min - max	Stm ³ /h	3.7 - 7.5	6.9 - 15	8.5 - 21
Light oil rate min - max	Kg/h	3 - 6	5.5 - 12	7 - 17
Gas pressure min.* - max.	mbar	20 - 200	20 - 200	20 - 200
Power supply - frequency		230 V - 50 Hz	230 V - 50 Hz	230 V - 50 Hz
Fan motor	kW	0.1	0.15	0.15
Pump motor	kW	0.1	0.1	0.1
Total power consumption	kW	0.25	0.25	0.25
Protection		IP40	IP40	IP40
Weight	Kg	20	27	27
Valves size		1/2"	3/4"	1"
Gas connection		Rp1/2	Rp3/4	Rp1
Operation		single stage	single stage	single stage
Destination country		*	*	*

Note: all gas flow rates (Stm³/h) are referred to standard gas conditions: 1013 mbar pressure, 15 °C temperature.

Flow rates are referred to G20 natural gas (nett calorific value: 34.02 MJ/Stm³), if G25 is used (n.c.v.: 29.25 MJ/Stm³), flow rates must be multiplied by 1.16 factor.

* Minimum pressure to get the maximum rate with any value of back pressure in combustion chamber. The burner operates correctly also with lower pressures but these must guarantee the needed rate.

BURNER MODEL IDENTIFICATION

Burners are identified by burner type and model. Burner model identification is described here following.

Type: HS5	Model:	MG.	PR.	S.	*	A.	O.	40
(1)		(2)	(3)	(4)	(5)	(6)	(7)	(8)

- | | | | |
|-----|---------------------|--------------------------|--|
| (1) | BURNER TYPE | | |
| (2) | FUEL | | MG - Natural gas / Light oil |
| (3) | OPERATION | Available versions | TN - Single stage |
| (4) | BLAST TUBE LENGHT | (see overall dimensions) | |
| | | Available versions | S - Standard |
| | | | L - Long |
| (5) | DESTINATION COUNTRY | | * - see data plate |
| (6) | SPECIAL VERSIONS | | A - Standard |
| (7) | EQUIPMENT | Available versions | 0 - 2 Valves |
| | | | 1 - 2 Valves + leak detection monitor (on request if output < 1200 kW) |
| (8) | GAS TRAIN SIZE | (see specifications) | |
| | | 15= Rp1/2 | 20=Rp3/4 25= Rp1 |

OVERALL DIMENSIONS

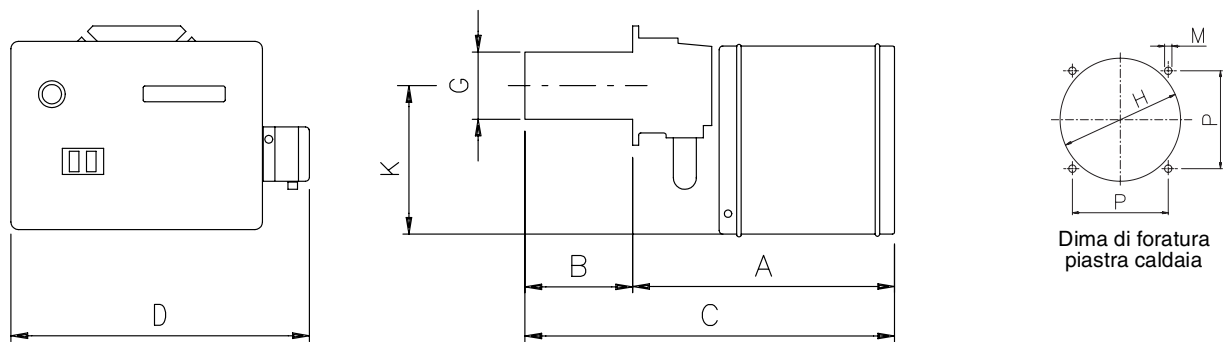


Fig. 1

	A	B	BL	C	CL	D	E	G	K	H	Pmin	Pmax	M
HS5	320	60	160	380	480	400	230	80	19	90	92	134	M8
HS10	350	160	255	510	605	430	255	108	210	115	105	134	M8
HS18	350	175	265	525	615	430	255	125	210	135	105	134	M8

PERFORMANCE CURVES

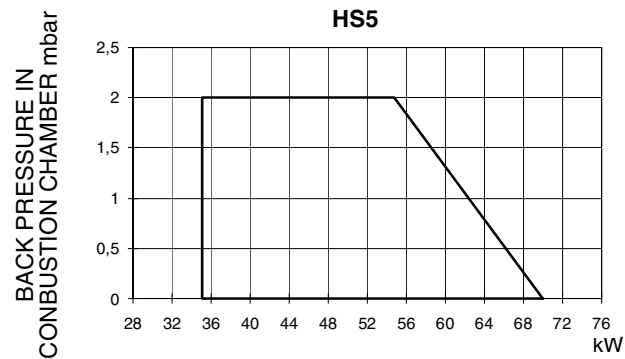


Fig. 2a

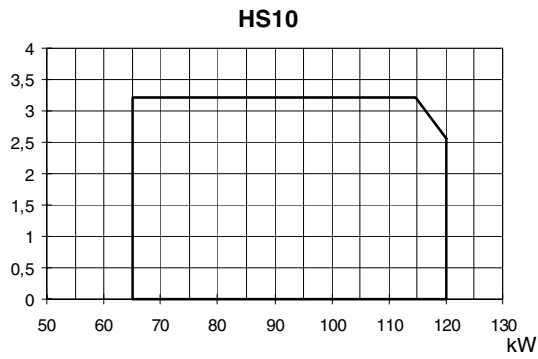


Fig. 2b

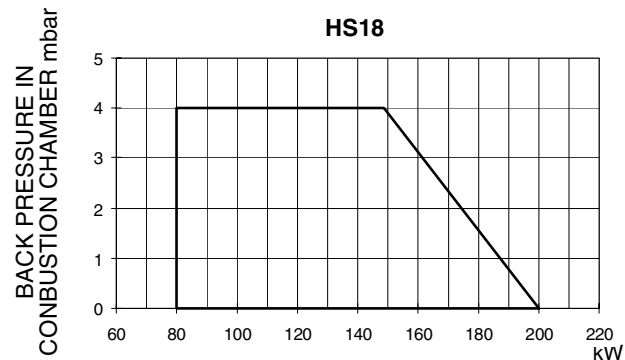


Fig. 3a

MOUNTINGS AND CONNECTIONS

Packing

The burners are despatched in cardboard packages of dimensions:

Type	Model	L	A	P
HS5	M-TN.S.*.A.0.15	360	460	300
HS5	M-TN.L.*.A.0.15	360	560	300
HS10	M-TN.S.*.A.0.20	420	620	340
HS10	M-TN.L.*.A.0.20	420	700	340
HS18	M-TN.S.*.A.0.25	420	620	340
HS18	M-TN.L.*.A.0.25	420	700	340

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

- 1 burner with detached gas train
- 1 gasket to be inserted between the burner and the boiler;
- 1 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.

Fitting the burner to the boiler

Fix the flange of the burner to the boiler as shown in Fig. 4.

This allow a correct inclination towards the combustion chamber. If necessary, after fitting the burner to the boiler, seal the space between the blast tube and the refractory lining with appropriate insulating material (ceramic fibre cord or refractory cement).

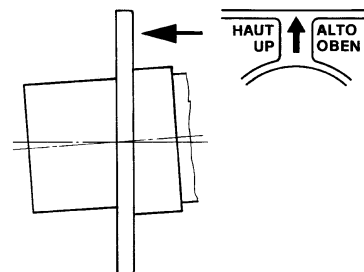


Fig. 4

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 Fig. 5. 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 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 100 mm into the combustion chamber.

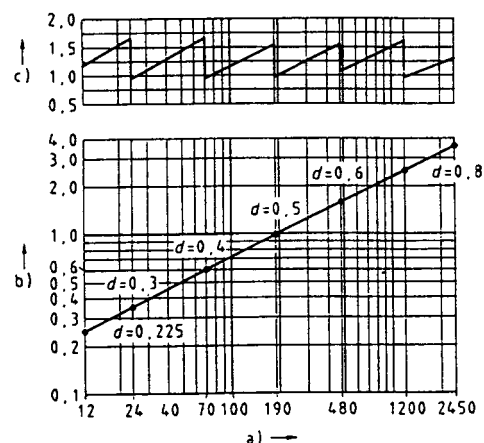
The length of the blast tubes does not always allow this requirement to be met, and thus it may be necessary to use a suitably-sized spacer to move the burner backwards.

- Pressurised boilers with flame reversal: in this case the blast tube must penetrate at least 50 - 100 mm into combustion chamber in respect to the tube bundle plate.

Key

- a) Heat input Q in kW
- b) Length of the flame tube in meters
- c) Flame tube firing intensity in MW/m³
- d) Combustion chamber diameter (m)

Fig. 5 - Firing intensity, diameter and lenght of the test flame tube as a function of the heat input Q.



ELECTRICAL CONNECTIONS

- Remove the burner cover.
- Carry out the electrical connections to the power supply connector as shown in Fig. 6.
- Refit the burner cover.

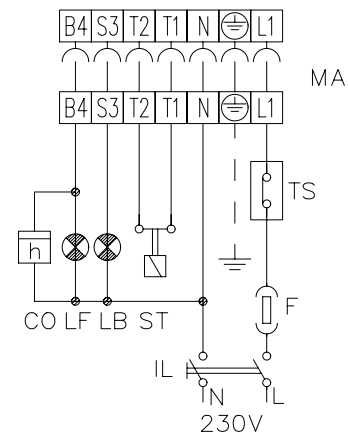


Fig. 6



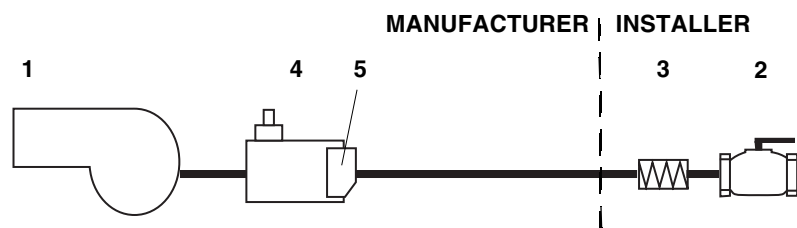
RESPECT THE BASIC SAFETY RULES. MAKE SURE OF THE CONNECTION TO THE EARTHING SYSTEM. DO NOT REVERSE THE PHASE AND NEUTRAL CONNECTIONS. FIT A DIFFERENTIAL THERMAL MAGNET SWITCH ADEQUATE FOR CONNECTION TO THE MAINS.

GAS TRAIN INSTALLATION DIAGRAM

The diagram in Fig. 7 shows the components of the gas train which are included in the delivery and those which must be fitted by the installer. The diagrams complies with regulations in force

Fig. 7

Burners fitted with Multibloc DUNGS MB-DLE... (2 valves + pressure switch + filter + pressure governor)



Key

- 1 Burner
- 2 Manual shut-off valve
- 3 Bellow joint
- 4 Multibloc valves group
- 5 Leakage control device

SETTINGS

Gas settings

WARNING!
THE SEALED SCREWS MUST NOT BE UNLOOSED!
IN A SUCH CASE THE DEVICE WARRANTY IS IMMEDIATELY INVALIDATE!

Fig. 8 - Multibloc MB-DLE - VPS504

The multibloc unit is a compact unit consisting of two valves, gas pressure switch, pressure stabilizer and gas filter. It can be paired jointly to the Dungs VPS504 sealing controls.

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 replacement of the coil.

Leakage control device VPS504 (Optional)

The VPS504 checks the operation of the seal of the gas shut off valves constituting the MB-DLE. This check, carried out as soon as the boiler thermostat gives a start signal to the burner, creates, by means of the diaphragm pump inside it, a pressure in the test space of 20 mbar higher than the supply pressure. When wishing to monitor the test, install a pressure gauge ranged to that of the pressure supply point PA. If the test cycle is satisfactory, after a few seconds the consent light LC (yellow) comes on. In the opposite case the lockout light LB (red) comes on.

To restart it is necessary to reset the appliance by pressing the illuminated pushbutton LB.

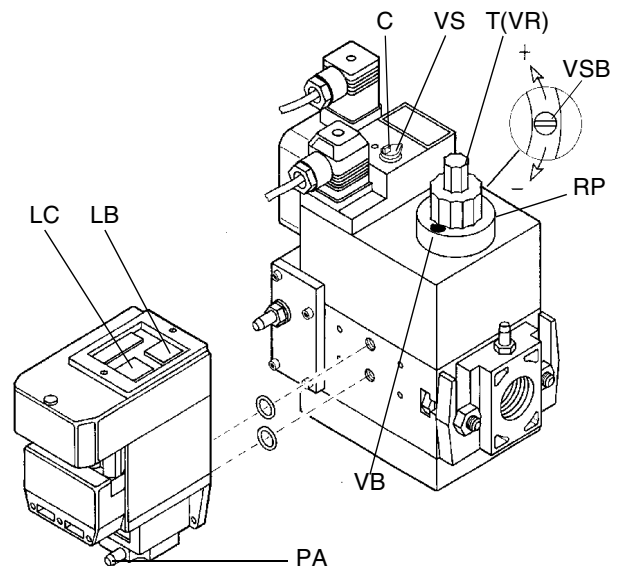


Fig. 8

Light oil settings
Light oil piping installation diagram

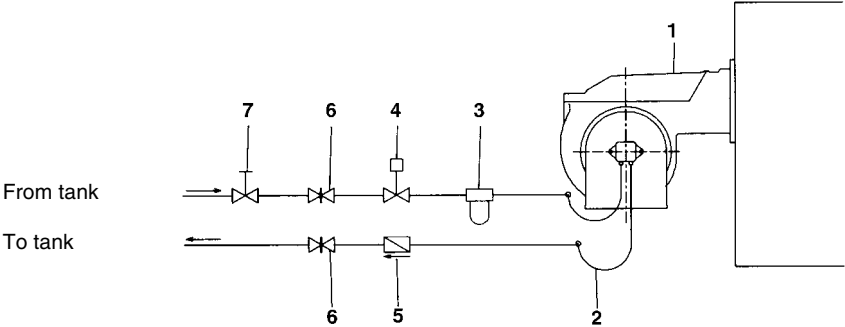


Fig. 9

Key

- 1 Burner
- 2 Flexible hoses (fitted)
- 3 Light oil filter (fitted)
- 4 Automatic interceptor (*)
- 5 One-way valve (*)
- 6 Gate valve
- 7 Quick-closing gate-valve (not in vicinity of tank or boiler)

(*) Only for installations with gravity, siphon or forced circulation feed systems. If the device installed is a solenoid valve, a timer must be installed to delay the valve opening.
The direct connection of the device without a timer may cause pump breaks

Sizing the light oil pipeline

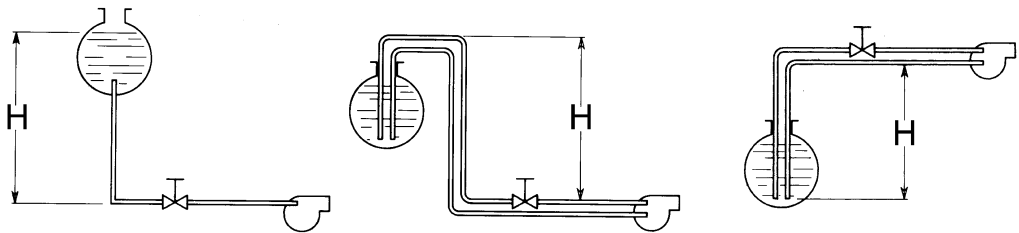


Fig. 10

Tab. 1

H (m)	L (m)		
	Ø 6	Ø 8	Ø 10
0	41	100	100
0.5	70	100	100
1	100	100	100
1.5	100	100	100
2	100	100	100
2.5	100	100	100
3	100	100	100
3.5	100	100	100
4	100	100	100
4.5	100	100	100
5	100	100	100

Tab. 2

H (m)	L (m)			
	Ø 6	Ø 8	Ø 10	Ø 12
0	19	77	100	100
1	24	90	100	100
2	30	100	100	100
3	34	100	100	100
4	39	100	100	100
5	44	100	100	100
6	48	100	100	100
7	52	100	100	100
8	56	100	100	100
9	55	100	100	100
10	51	100	100	100

Tab. 3

H (m)	L (m)			
	Ø 6	Ø 8	Ø 10	Ø 12
0	18	73	100	100
0.5	15	66	100	100
1	13	59	100	100
1.5	10	52	100	100
2	7	44	100	100
2.5	5	44	100	100
2.5	-	37	100	100
3	-	30	85	100
3.5	-	23	68	100
4	-	-	-	100
4.5	-	-	-	-

Monotube system

The burners leave the factory equipped for twin-tube feed. They can be adapted for a mono-tube system (recommended in the case of gravity feed). Refer to the Appendix for further details.

SETTINGS

Oil rate adjustment

The oil rate is set choosing a properly sized nozzle and adjusting the feeding pressure to the nozzle, in the pump (see principle diagram of the light oil ring in Fig. 9).

To choose the proper nozzle refer to Tab. 4; to set the pump pressure see technical data on Page 11. For further informations on oil pumps see the appendix.

Starting the pump

Before carrying out the adjustment it is necessary to start up the oil pump proceeding as follows:

- before operating the burner, make sure that the return pipe to the tank is not obstructed. Any obstruction would cause the pump seal to break.
- Start the burner, light up the photoresistance after opening the solenoid valve and let the air escape from the pressure gauge connection.

Key

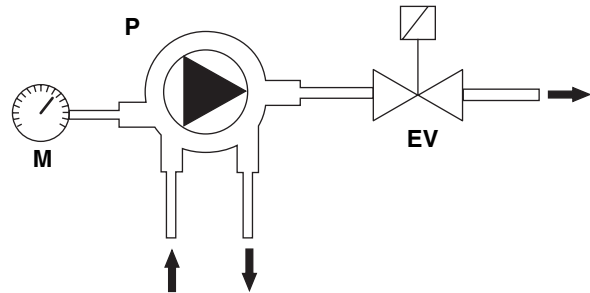
EV1 Light oil solenoid valve

EV2 Light oil solenoid valve

M Pressure gauge

P Pump

Fig. 11
Burners HS5 - HS10



Pump pressure

HS5 - HS10

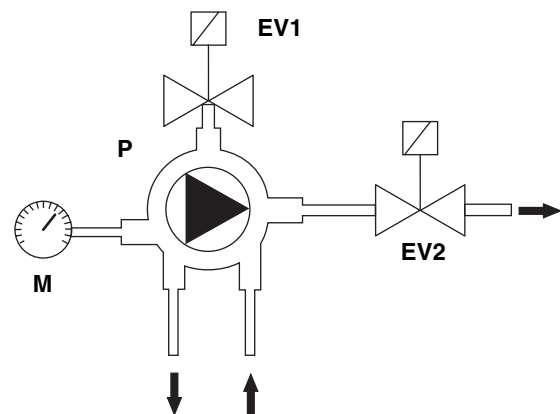
12 bar

HS18

first stage, 8 bar

second stage, 18 bar

Fig. 12
Burners HS18



Nozzle G.P.H.	PUMP PRESSURE Bar											
	8	9	10	11	12	13	14	15	16	17	18	
0.40	1.36	1.44	1.52	1.59	1.66	1.73	1.80	1.86	1.92	1.98	2.04	
0.50	1.70	1.80	1.90	1.99	2.08	2.17	2.25	2.33	2.40	2.48	2.55	
0.60	2.04	2.16	2.28	2.39	2.50	2.60	2.70	2.79	2.88	2.97	3.06	
0.65	2.21	2.34	2.47	2.59	2.70	2.82	2.92	3.02	3.12	3.22	3.31	
0.75	2.55	2.70	2.85	2.99	3.12	3.25	3.37	3.49	3.60	3.71	3.82	
0.85	2.89	3.06	3.23	3.39	3.54	3.68	3.82	3.95	4.08	4.21	4.33	
1.00	3.40	3.60	3.80	3.98	4.16	4.33	4.49	4.65	4.80	4.95	5.10	
1.10	3.74	3.96	4.18	4.38	4.58	4.76	4.94	5.12	5.29	5.45	5.61	
1.20	4.08	4.32	4.56	4.78	4.99	5.20	5.39	5.58	5.77	5.94	6.12	
1.25	4.25	4.50	4.75	4.98	5.20	5.41	5.62	5.82	6.01	6.19	6.37	
1.35	4.59	4.86	5.13	5.38	5.62	5.85	6.07	6.28	6.49	6.69	6.88	
1.50	5.10	5.41	5.70	5.98	6.24	6.50	6.74	6.98	7.21	7.43	7.64	
1.65	5.61	5.95	6.27	6.57	6.87	7.15	7.42	7.68	7.93	8.17	8.41	
1.75	5.95	6.31	6.65	6.97	7.28	7.58	7.87	8.14	8.41	8.67	8.92	
2.00	6.80	7.21	7.60	7.97	8.32	8.66	8.99	9.30	9.61	9.91	10.19	
2.25	7.64	8.11	8.55	8.96	9.36	9.74	10.11	10.47	10.81	11.14	11.47	
2.50	8.49	9.01	9.50	9.96	10.40	10.83	11.24	11.63	12.01	12.38	12.74	
3.00	10.19	10.81	11.40	11.95	12.48	12.99	13.48	13.96	14.41	14.86	15.29	
3.50	11.89	12.61	13.29	13.94	14.56	15.16	15.73	16.28	16.82	17.33	17.84	

Tab. 4

LIGHT OIL PUMPS

Pump Suntec AT2 45A

Viscosity range	2 ÷ 12 cSt
Oil temperature	60°C max
Inlet pressure	2 bar max.
Return pressure	2 bar max.
Suction height	max. 0,35 bar to avoid air separation from oil.
Rated speed	3600 rpm

Key

- 1 Pressure regulation
- 2 Manometer
- 3 Vacuummeter
- 4-4a Solenoid valve
- 5 To oil nozzle
- 6 Low pressure regulation
- 7 Suction
- 8 Return

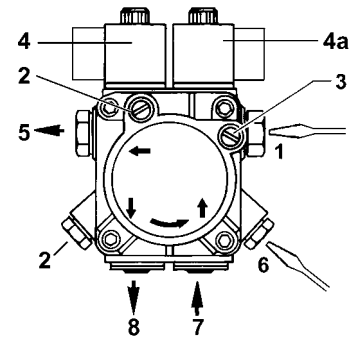


Fig. 13

Pump Suntec AS47 A

Viscosity	2 - 12 mm ² /s (cSt)
Fuel temperature	0 - 60 °C into the pump
Inlet pressure	2 bar max.
Return pressure	2 bar max.
Suction height	0,45 bar max. to avoid air separation from oil.
Rated speed	3600 rpm max.

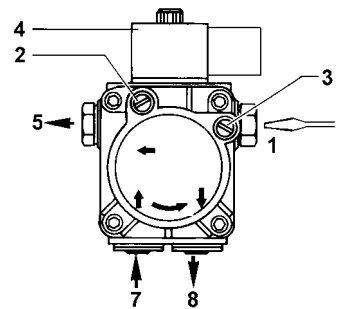


Fig. 14

Pumps Delta VM

Viscosity	2 ÷ 50 cSt
Oil temperature	60°C max
Inlet pressure	0,7 bar max.
Return pressure	1,5 bar max.
Suction height	max. 0,5 bar to avoid air separation from oil.
Rated speed	3500 rpm

Key

- 1 Pressure regulation
- 2 Manometer
- 3 Vacuummeter
- 4 - 4a Solenoid valve
- 5 To oil nozzle
- 7 Suction
- 8 Return

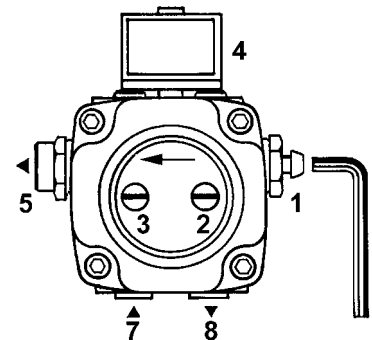


Fig. 15

AIR RATE SETTING

⚠ ATTENTION: During commissioning operations, do not let the burner operate with insufficient air flow (danger of formation of carbon monoxide); if this should happen, shut down the burner, increase the opening of the air damper and start up the burner again to ensure the purging of the carbon monoxide from the combustion chamber.

Slacken the screw VBS and manually rotate the air damper as needed.

At the end of settings tight the screw VBS.

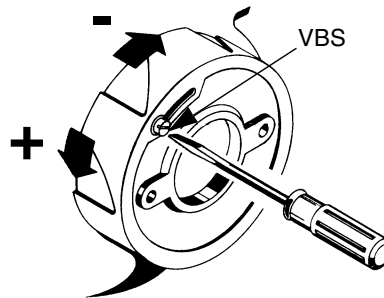


Fig. 16

Calibration of air pressure switch (single stage burners)

Calibration is carried out as follows:

- Remove the transparent plastic cap.
- After air and gas setting have been completed, start the burner.
- The pre-purge phase starts; wait 10 sec. then slowly turn the adjusting ring nut VR in the clockwise direction until the burner lockout, read the value on the pressure switch scale and reduce it by 0.5 mbar.
- Repeat the start up cycle of the burner and check it runs properly.
- Refit the transparent plastic cover on the pressure switch.

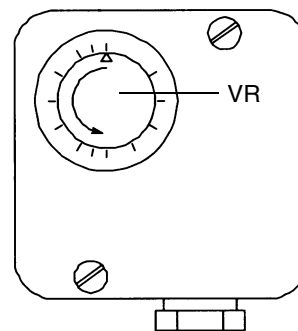


Fig. 17

Calibration of minimum gas pressure switch

Calibration is carried out as follows:

- Remove the transparent plastic cap.
- With the burner in operation test the pressure on the pressure port at the input of the gas filter; slowly close the manual shut-off valve (see gas train installation diagram) until the detected pressure is reduced by 50%.
- Verify CO emissions of the burner; if the measured value is less than 80 ppm screw down the adjusting ring nut until the burner lockout. If CO emissions are greater than 80 ppm open the shut off valve until the CO value is reduced to 80 ppm, then screw down the adjusting ring nut until the burner lockout.
- Fully open the manual shut-off valve **⚠ WARNING: carry out this operation ONLY with the burner turned off!**
- Refit the transparent plastic cover on the pressure switch.

Adjusting the combustion head

To adjust the combustion head rotate the ring nut VR. Rotate clockwise to close the combustion head or turn counterclockwise to open it.

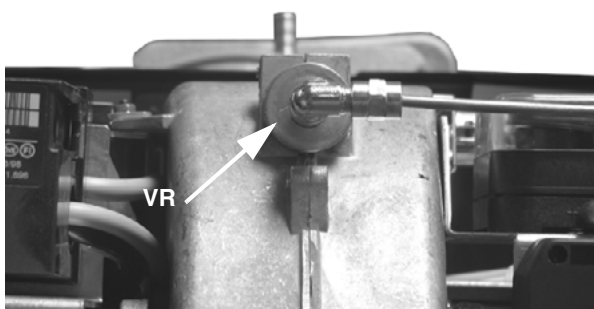


Fig. 18a

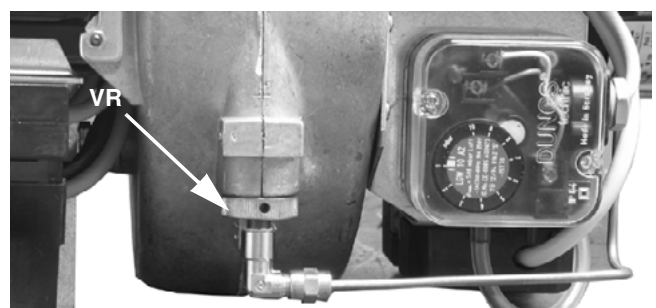


Fig. 18b

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.

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

IN THE EVENT OF REPEATED LOCKOUTS, DO NOT PERSIST WITH THE RESET BUTTON AND CONTACT QUALIFIED PERSONNEL WHO WILL PROCEED TO ELIMINATE THE MALFUNCTION.

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

OPERATION

- Choose the fuel with the switch B in Fig. 19, located on the burner casing.
- Turn on the power supply with the main switch A in Fig. 19.
- Check the flame control device is not lock, eventually release it by means of the pushbutton located on the hole on the burner casing.
- Check the series of thermostats (or pressure switches) enable the burner to operate.
- The start cycle of the burner begins, the flame controller starts the burner fan and meanwhile energizes the ignition transformer.
- At the end of the pre-purge, the solenoid valve of the selected fuel and the ignition transformer are both energized and the burner starts.
- The ignition transformer remains in operation for any seconds after the flame appears (post-ignition time) and after this time it is suited off.

ONLY BURNERS HS18: at the end of the safety time the flame controller energizes the second light oil solenoid valve.

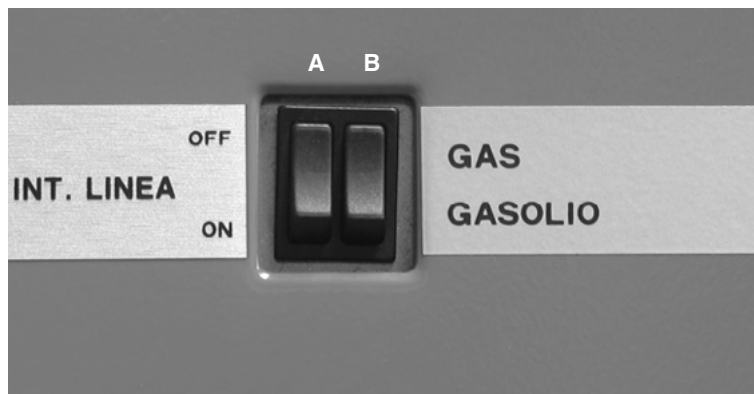


Fig. 19

PART III: MAINTENANCE MANUAL

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!

PERIODICAL SERVICING

- Clean and examine the oil filter cartridge and replace it if necessary.
- Examine the condition of the oil flexible hoses and check for possible leaks.
- Clean and examine the filter inside the oil pump (see instructions in the Appendix).
- Dismantle, examine and clean the combustion head and when reassembling be carefully to respect the measures shown in Tab. 5
- Check the detection photocell, clean it and adjust the position if needed and, if necessary, replace it. If in doubt, check the detection circuit after the burner has been restarted, following the diagram in Fig. 20.

Correct position of electrodes and combustion head (Fig. 19a e Fig. 19b)

- Prepare a stable surface where lean the burner during maintenance.
- To gain access to the combustion head and to the nozzles, slacken the screw on the blast tube and remove it from the part that remains fixed to the boiler.
- To guarantee a good ignition, respect the measures indicated in Tab. 5.
- Be sure to tight the screw that fix the electrodes group, before reassembly the burner.

Tab. 5

	NOZZLE	A	B	C	D
HS5 - 10 - 18	45°	3	2,5	3	7 ÷ 8

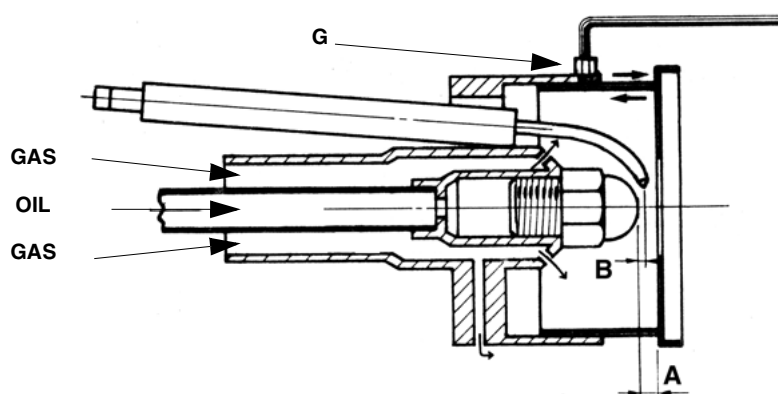


Fig. 19a

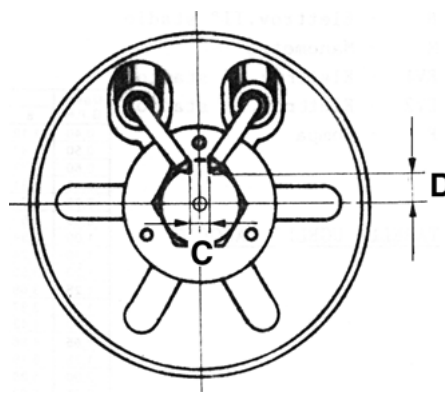


Fig. 19b

Check of the ionization current

See the diagram in Fig. 20 to measure the detection current. If the signal doesn't suit the suggested value, verify the electric terminals, the cleaning of the combustion head and the position of the photoelectric cell and replace it if required

Minimum current intensity with flame,
200 μ A

Maximum possible current intensity
with flame, 500 μ A

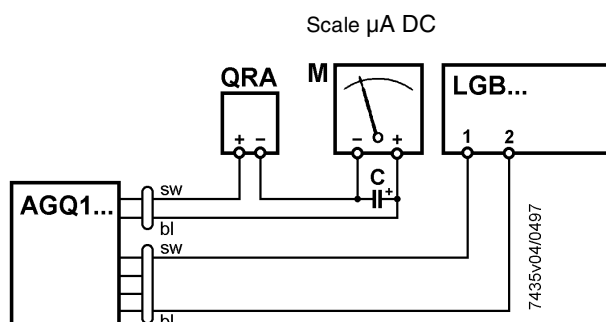


Fig. 20

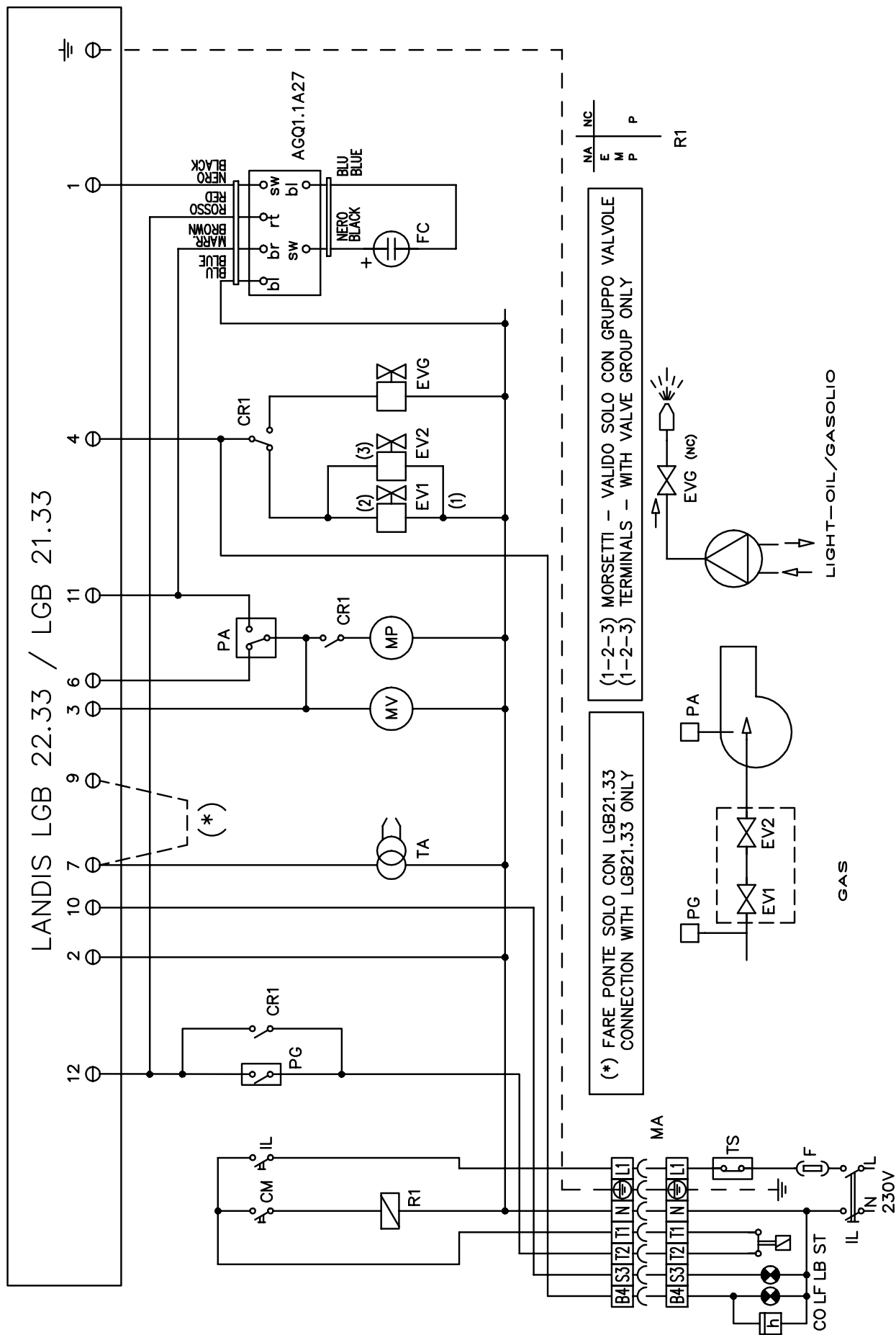
ELECTRICAL DIAGRAMS

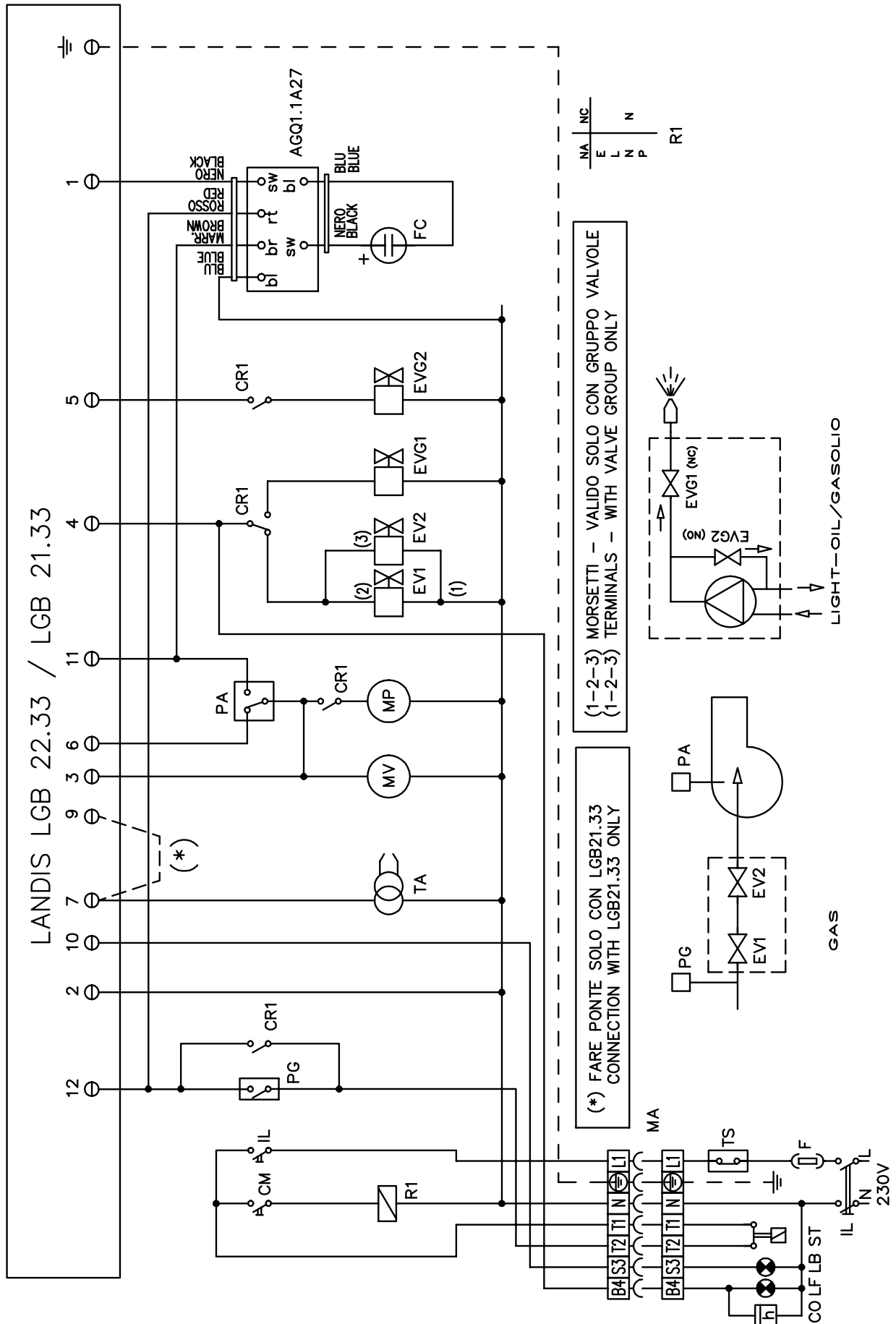
Complete key

AGQ1.1A27	Auxiliary equipmet for UV photocells
CM	Manual selector NATURAL GAS / LIGHT OIL
CO	Time counter
CR1	Auxiliary relais contactd
EV1	Gas solenoid valve, network side (or valves group)
EV2	Gas solenoid valve, burner side (or valves group)
EVG	Light oil solenoid valve
EVG1	Light oil solenoid valve, 1st stage
EVG2	Light oil solenoid valve, 2nd stage (soft start)
F	Fuse
FC	Flame detetion UV probe
IL	Mains switch
L	Phase
LB	Burner lock-out signalling lamp
LF	Burner operation signalling lamp
LGB..	LANDIS flame controller
MA	Power supply terminal board
MP	Light oil pump motor
MV	Fan motor
N	Neutral
R1	Auxiliary relay
ST	Thermostats or pressure switches serie
TA	Ignition transformer
TS	Safety thermostat/pressure switch on boiler

ATTENTION

- 1 - Power supply 230V 50Hz 2N a.c.
- 2 - Don't reverse phase with neutral
- 3 - Ensure the burner is properly hearthed





SPARE PARTS

DESCRIPTION	HS5
PHOTOCELL ADAPTER AGQ1.1A27	2510101
FLAME CONTROL DEVICE	2020443
FLAME CONTROL DEVICE SOCKET	2030415
COIL FOR DANFOSS SOLENOID VALVE	2580701
COIL FOR DELTA SOLENOID VALVE	2580406
COIL FOR SUNTEC SOLENOID VALVE	2580402
COIL FOR MULTIBLOC	2580018
COMPLETE BLAST TUBE, STANDARD	3090073
COMPLETE BLAST TUBE, LONG	3090087
IGNITION CABLE	6050122
CONDENSER FOR PUMP MOTOR	6030005
CONDENSER FOR FAN MOTOR	6030005
FEMALE CONNECTOR, 7 POLES	6200043
MALE CONNECTOR, 7 POLES	6200042
LEAK CONTROL DEVICE (optional)	2191604
IGNITION ELECTRODE	2080245
FILTER	2090001
FLANGE FOR MULTIBLOC	2191518
BURNER SLIDING FLANGE	2100025
FLEXIBLE HOSE	2340001
PHOTOCELL	2510001
COMPLETE PUMP COUPLING	2540016
MULTIBLOC VALVES GROUP	2190339
GASKET	2110027
TRANSFORMATION KIT FOR SHORT TO LONG BLAST TUBE	3091147
TRANSFORMATION KIT FOR LONG TO SHORT BLAST TUBE	3091227
PUMP MOTOR	2180004
FAN MOTOR	2180013
PUMP DANFOSS BFP21R3R	2590309
PUMP DELTA VM1RL2	2590012
PUMP SUNTEC AS47A	2590130
AIR PRESSURE SWITCH	2160053
MINIMUM GAS PRESSURE SWITCH	2160076
FLAME CONTROLLER SUPPORT BRACKET	3050014
COMBUSTION HEAD WITH ELECTRODES (STANDARD)	3501701
COMBUSTION HEAD WITH ELECTRODES (LONG)	3501702
TRANSFORMER	2170106
NOZZLE (SPECIFY SPRAY ANGLE AND OIL RATE)	2610002
FAN	2150003
DOUBLE SWITCH (ON-OFF AND FUEL SELECTION)	6170005

DESCRIPTION	HS10
PHOTOCELL ADAPTER AGQ1.1A27	2510101
FLAME CONTROL DEVICE	2020443
FLAME CONTROL DEVICE SOCKET	2030415
COIL FOR DANFOSS SOLENOID VALVE	2580701
COIL FOR DELTA SOLENOID VALVE	2580406
COIL FOR SUNTEC SOLENOID VALVE	2580402
COIL FOR MULTIBLOC	2580018
COMPLETE BLAST TUBE, STANDARD	3090074
COMPLETE BLAST TUBE, LONG	3090094
IGNITION CABLE	6050122
CONDENSER FOR PUMP MOTOR	6030003
CONDENSER FOR FAN MOTOR	6030003
CONDENSER FOR FAN MOTOR (alternate)	6030005
FEMALE CONNECTOR, 7 POLES	6200043
MALE CONNECTOR, 7 POLES	6200042
LEAK CONTROL DEVICE (optional)	2191604
IGNITION ELECTRODE	2080246
FILTER	2090001
FLANGE FOR MULTIBLOC	2190366
FLEXIBLE HOSE	2340001
PHOTOCELL	2510001
COMPLETE PUMP COUPLING	2540016
MULTIBLOC VALVES GROUP	2190340
GASKET	2110031
TRANSFORMATION KIT FOR SHORT TO LONG BLAST TUBE	3091148
TRANSFORMATION KIT FOR LONG TO SHORT BLAST TUBE	3091228
PUMP MOTOR	2180004
FAN MOTOR	2180703
FAN MOTOR (alternate)	2180005
PUMP DANFOSS BFP21R3R	2590309
PUMP DELTA VM1RL2	2590012
PUMP SUNTEC AS47A	2590130
AIR PRESSURE SWITCH	2160053
MINIMUM GAS PRESSURE SWITCH	2160076
FLAME CONTROLLER SUPPORT BRACKET	3050015
COMBUSTION HEAD WITH ELECTRODES (STANDARD)	3501703
COMBUSTION HEAD WITH ELECTRODES (LONG)	3501704
TRANSFORMER	2170106
NOZZLE (SPECIFY SPRAY ANGLE AND OIL RATE)	2610002
FAN	2150004
DOUBLE SWITCH (ON-OFF AND FUEL SELECTION)	6170005

DESCRIPTION	HS18
PHOTOCELL ADAPTER AGQ1.1A27	2510101
FLAME CONTROL DEVICE	2020443
FLAME CONTROL DEVICE SOCKET	2030415
COIL FOR SUNTEC SOLENOID VALVE	2580402
COIL FOR MULTIBLOC	2580017
COMPLETE BLAST TUBE, STANDARD	3090075
COMPLETE BLAST TUBE, LONG	3090098
IGNITION CABLE	6050122
CONDENSER FOR PUMP MOTOR	6030005
CONDENSER FOR FAN MOTOR	6030005
CONDENSER FOR FAN MOTOR (alternate)	6030005
FEMALE CONNECTOR, 7 POLES	6200043
MALE CONNECTOR, 7 POLES	6200042
LEAK CONTROL DEVICE (optional)	2191604
IGNITION ELECTRODE	2080246
FILTER	2090016
FLANGE FOR MULTIBLOC	2190367
FLEXIBLE HOSE	2340001
PHOTOCELL	2510001
COMPLETE PUMP COUPLING	2540016
MULTIBLOC VALVES GROUP	2190341
GASKET	2110031
TRANSFORMATION KIT FOR SHORT TO LONG BLAST TUBE	3091149
TRANSFORMATION KIT FOR LONG TO SHORT BLAST TUBE	3091229
PUMP MOTOR	2180004
FAN MOTOR	2180703
FAN MOTOR (alternate)	2180005
PUMP SUNTEC AT245A	2590152
AIR PRESSURE SWITCH	2160053
MINIMUM GAS PRESSURE SWITCH	2160076
FLAME CONTROLLER SUPPORT BRACKET	3050015
COMBUSTION HEAD WITH ELECTRODES (STANDARD)	3501705
COMBUSTION HEAD WITH ELECTRODES (LONG)	3501706
TRANSFORMER	2170106
NOZZLE (SPECIFY SPRAY ANGLE AND OIL RATE)	2610002
FAN	2150004
DOUBLE SWITCH (ON-OFF AND FUEL SELECTION)	6170005

APPENDIX - COMPONENTS CHARACTERISTICS

LANDIS LGB 21/22.. FLAME CONTROLLER	22
GAS MULTIBLOC REGULATOR DUNGS MB-DLE 405-407-410-412-415-420	25
VALVE PROVING SYSTEM DUNGS VPS504	25
SUNTEC AT2 PUMP	26
SUNTEC PUMPS AS 47 - 57 - 67	27
DELTA VM PUMPS	28
NOTES FOR USE AND MAINTENANCE OF FUEL PUMPS	29

LANDIS LGB 21/22.. FLAME CONTROLLER

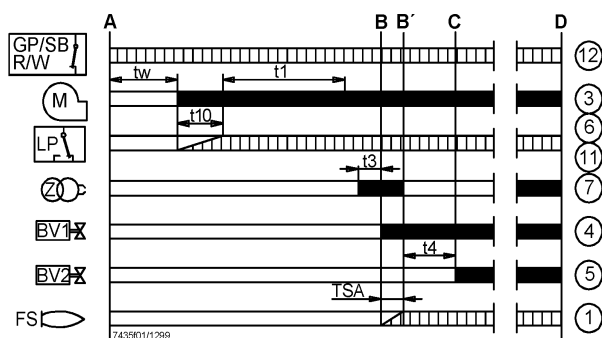
Function

The programme run is shown in the diagrams. The required and permissible input signals for the control part and flame supervision part are pictured as a hatching correspondingly in the function diagrams. If these input signals are missing, the controller interrupts the start-up programme and initiates a lock-out at the place where the safety regulations demand it.

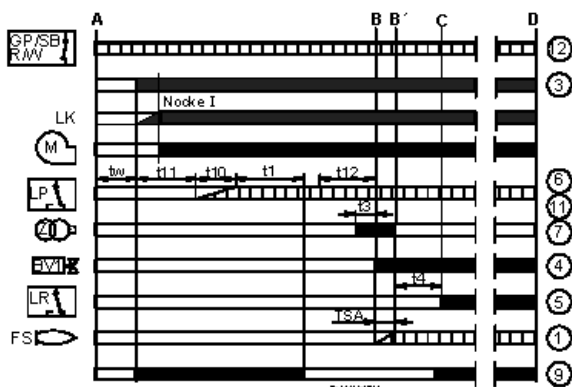
The LGB types are fitted with under voltage protection, i.e. the load relay AR is de-energized when the supply voltage falls below 160 V. The burner control automatically attempts a new start-up when the supply voltage again exceeds 160 V

- A Start-up command from the temperature or pressure controller "R"
- A-C Start-up programme
- C-D Burner operation (heat production corresponding to the control commands)
- D Controlled shut-down by "R"

LGB21



LGB22



Key for operation diagram

- A - C Startup sequence
- tw Waiting time, 8s for LGB21, 9s for LGB22
- t1 Prepurge time 30s
- TSA Ignition safety time 3s
- t3 Preignition time, 2s for LGB21, 3s for LGB22
- t4 Interval «BV1-BV2» or «BV1-LR», 8s
- t10 Specified time for air pressure signal, 5s for LGB21, 3s for LGB22
- t11 Programmed opening time for actuator «SA», max. 12s
- t12 Programmed closing time for actuator «SA», max. 11s
- BV Fuel valves
- FS Flame presence signal
- GP Gas pressure switch
- LP Air pressure switch
- LR Load controller
- M Fan motor
- R Temperature or pressure controller
- W Safety thermostat or pressure switch
- Z Ignition transformer
- 1...12 Terminals of the burner flame controls on AGK11's socket
- Command signal from flame control
- ▨ Input signals

Conditions for starting up the burner:

- The burner control must not be locked out.
- The contacts of the gas pressure switch "GP", the temperature or pressure switch "W" and the controller "R", must be closed.

Start-up programme

A Start command (switching on)

This command is triggered by control thermostat / pressure controller «R». Terminal 12 receives voltage and the programming mechanism starts running. On completion of waiting time «tw» with the LGB21..., or after air damper «SA» has reached the nominal load position (on completion of «t11») with the LGB22..., fan motor «M» will be started.

tw Waiting time

During the waiting time, air pressure monitor «LP» and flame relay «FR» are tested for correct contact positions.

t11 Programmed opening time for actuator «SA»

(Only with LGB22...) The air damper opens until the nominal load position is reached. Only then will fan motor «M» be switched on.

t10 Specified time for air pressure signal

On completion of this period of time, the set air pressure must have built up, or else lockout will occur.

t1 Prepurge time

Purging the combustion chamber and the secondary heating surfaces: required with low-fire air volumes when using the LGB21... and with nominal load air volumes when using the LGB22.... The diagrams show the so-called prepurge time «t1» during which air pressure monitor «LP» must indicate that the required air pressure is available. The effective prepurge time «t1» comprises interval end «tw» through «t3».

t12 Programmed closing time for actuator «SA»

(Only with LGB22...) During «t12», the air damper travels to the low-fire position.

t3 Preignition time

During «t3» and up to the end of «TSA», flame relay «FR» is forced to close. On completion of «t3», the release of fuel is triggered at terminal 4.

TSA Ignition safety time

On completion of «TSA», a flame signal must be present at terminal 1. That flame signal must be continuously available until shutdown occurs, or else flame relay «FR» will be deenergized, resulting in lockout.

t4 Interval

LGB21...: time to the release of the second fuel valve «BV2»

LGB22...: on completion of «t4», the heat source is controlled depending on the load (release of load controller «LR»)

B - B' Interval for flame establishment

C Burner operation position

C - D Burner operation (heat production)

Operation of the burner at the maximum strength or, with a flame controller for the load.

D Controlled by "R" shutdown

The burner stops, waiting for the next ignition.

Command program in the event of a defect

In the event of a defect the inflow of fuel is interrupted. When the block occurs in the prevention time (not indicated by the symbol) the causes may be the air pressostat LP or a premature signal of flame presence.

- With voltage failure: repetition of the start-up with complete programme
- Premature presence of flame at the start of prevention time: safety stop (block)
- Contact of air pressostat LP stuck during time tw: start-up cannot take place.
- Air pressure failure after t10: safety stop after safety time TSA
- Absence of confirmation of air pressure: safety stop(block) after t10
- Failure to start up the burner: safety stop after safety time TSA
- Absence of flame during functioning: immediate safety stop.
- Checking the ignition spark with QRE: with absence of spark there is no consent to the fuel, safety stop (block) after time t2.

Unblocking the appliance

Unblocking of the appliance can be effected immediately after the safety stop without causing modification of the programme.

Indicator of the command programme of the defective item

On the front part of the safety appliance is located a plexiglass lunette under which there is the indicator disc of programme's progress.

In the event of safety stop, the programmer stops. The disc shows, as follows, the position of the programme at which the interruption occurred:

- no start-up, the command ring is open
- |||| interval tw or t10 on LGB21; tw or t11 on LGB22
- ▲ air damper open (LGB22)
- P safety stop (block) through absence of the air pressure signal (LGB21) or because (LGB22) the air damper is not open
- ➡➡ interval t1, t3 (t12)
- ▼ fuel consent (LGB22)
- 1 safety stop (block) through absence of the flame signal at the end of the 1st safety time
- 2 consent of the 2nd fuel valve (LGB 21) or consent at the power regulator (LGB22)
- oooo functioning of the burner at partial or maximum power (or return to the service position)

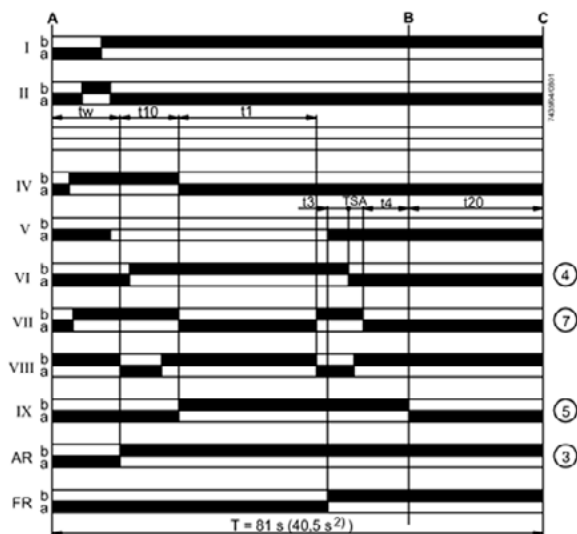
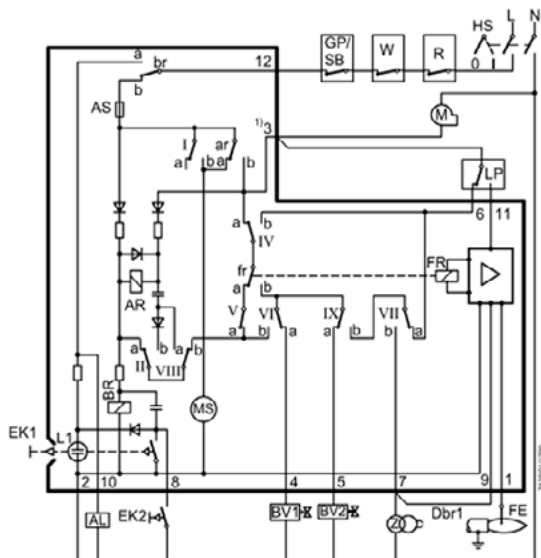
Specifications

Supply voltage	220 V AC -15%...240 VAC +10%
Frequency	50 Hz -6%...60 Hz +6%
Consumption	3 VA
Flow rate of the contacts at terminals	
- terminal 3	max. 3 A (15 A max. for 0.5s)
- terminals 4, 5, 7	max. 2 A
- terminal 10	max. 1 A
- terminal 12 (for Umax 264 V)	max. 5 A*
Fuse max.	10 A, with slow blow-out
Radio disturbance	N - VDE0875
Protection	IP40
Permissible ambient temperature	
- operating	-20....+ 60°C
- transport and storage	-40....+ 70°C
Mounting pos. permitted	any
Mass (weight) without/with basec.	230/310 g
Mass (weight) AGK66	c. 12 kg
*) At permissible voltage and that is 187...264 V	

Key - internal diagram

AL	Block signal
AR	Main relay with "ar" contacts
BR	Block relay with "br" contacts
BV	Fuel valve
Dbr1	U bolt
EK	Unblocking button
FE	Detection electrode
FR	Flame relay with "fr" contacts
GP	Gas pressostat
HS	Main selector
L	Phase conductor
L1	Block light (blinking)
LP	Air pressostat
M	Fan motor
MS	Synchronous motor
N	Neutral conductor
R	Thermostat or pressostat
W	Safety thermostat or pressostat
Z	Ignition transformer

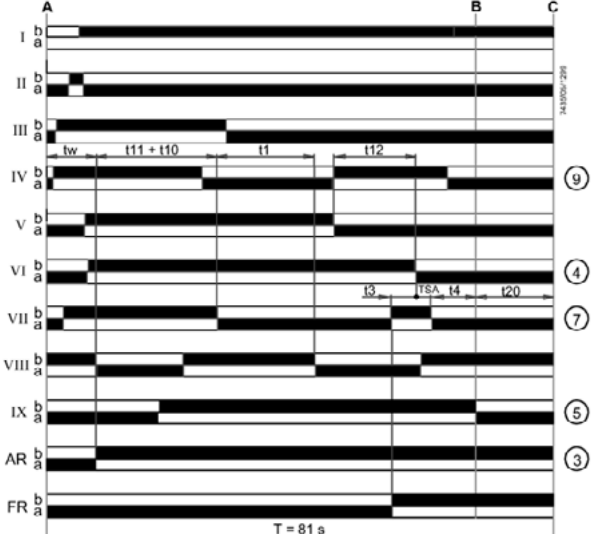
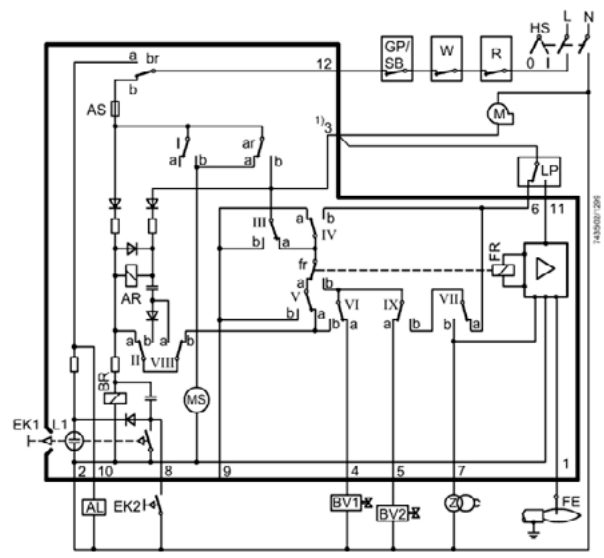
LGB21



Key - programmer's diagram

A	start-up (command from regulator "R")
B	burner operation
C	program start position (start up)
tw	waiting time
t1	prevention time
TSA	safety time
t3	pre-ignition time
t4	interval of time BV1-BV2 or BV1-LR
t10	waiting time for confirmation of air pressure
t11	air damper movement time to open position
t12	air damper movement time to close position
t20	travel time for auto-return of the programmer
T	programmer's total time
I.IX	contacts of programmer's cams

LGB22



GAS MULTIBLOC REGULATOR DUNGS MB-DLE 405-407-410-412-415-420

Specifications

Nominal diameters - Flange with pipe threads as per ISO 7/1 (DIN 2999)

MB 405-407: Rp1/2, 3/4 and their combinations

MB 410-412: Rp3/4, Rp1, Rp1_{1/4} and their combinations

MB 415 B01: Rp1, Rp1_{1/4}, Rp1_{1/2}, Rp2 and their combinations

MB420 B01: Rp1, Rp1_{1/4}, Rp1_{1/2}, Rp2 and their combinations

Max. operating pressure 360 mbar

Output pressure range 4 mbar to 20 mbar

Pressure stage PN1

Media gas of families 1, 2, 3 and other neutral gaseous media

Ambient temperature -15 °C to +70 °C

Dirt trap Sieve with 0.8 mm mesh width, filter made of random laid nonwoven fabric microfilter, two-layer, changing the filter is possible without removing the valve.

Pressure switches Types GW A5, GW A2, NB A2, ÜB A2 mountable as per DIN EN 1854.

Pressure regulator Pressure regulator compensated for residual pressure, leakproof seal when switched off by means of valve V1 as per DIN EN 88 Class A. Setpoint spring permanently installed (no spring exchange possible). A vent line above roof is not required. Internal pulse tap provided.

Solenoid valve 1 Valve as per DIN EN 161, Class A, Group 2, fast closing, fast opening

Solenoid valve 2 valve as per DIN EN 161, Class A, Group 2, fast closing, slow opening

Measuring/ignition gas connection

For G 1/8 as per DIN ISO 228

Burner pressure monitor pBr

Connection downstream of valve V2, pressure switch A2 mountable on adapter laterally

Closed position signal contact Closed position signal contact type K01/1 (DIN tested), mountable on V2

Voltage/frequency ~ (AC) 50-60Hz 230 V -15% +10%

Preferred voltages 240VAC, 110-120VAC, 24-28VDC, 48VDC

Electrical connection Plug connection as per DIN 43 650, IEC 335, IEC 730 (VDE 0700, VDE 0722) for valves and pressure switches

Rating power/consumption upon request

Switch on duration 100% ED

Degree of protection IP54 as per IEC 529 (EN 60529)

Radio interference Interference degree N

Material of gas-conveying parts

housing: aluminium die casting;

diaphragms, seals: NBR basis, Silopren (silicone rubber)

solenoid drive: steel, brass, aluminium.

Installation position

Solenoid vertically upright or lying horizontally as well as its intermediate positions

VALVE PROVING SYSTEM DUNGS VPS504

Specifications

Operating pressure max. 500 mbar (50 kPa)

Test volume 4.0 l

Pressure increase by motor pump 20 mbar

Nominal voltage ~ (AC) 230V -15%...240V +10% DC 24V

Frequency 50 Hz

Rating requirement during pumping time approx. 60 VA, in operation 17 VA

Prefuse (provided by the customer) 10 A quick-acting fuse or 6.3 slow-blow fuse

Fuse installed in housing cover, replaceable microfuse 6.3 A slow-blow L 250 V; IEC-127-2/III (DIN 41 662)

Degree of protection IP40 (IP54 series 04, 05)

Ambient temperature 50 Hz 230 VAC -15°C to +70°C, others: -15°C to +60°C

Release time Approx. 10 - 26s, depending on test volume and input pressure

Sensitivity limit max. 50 l/h

Switch on duration of control 100%

Max. number of test cycles 20/h

Installation position upright, horizontal, not inverted

SUNTEC AT2 PUMP

The SUNTEC AT2 oil pump features 2 mode pressure operation and incorporates a blocking solenoid valve with in-line cut-off function. Switching between low and high modes is assured by a 2nd integral solenoid valve.

Operation

The gear set draws oil from the tank through the built-in filter and transfers it to the nozzle line via the cut-off solenoid valve. Pressure regulation is assured by two spool valves, one for each pressure mode. Switching between low and high pressure is assured by a "normally open" by-pass solenoid valve. When this solenoid is non-activated, a by-pass channel is open, allowing the normal functioning of the low pressure valve which sets the nozzle pressure. When this solenoid is activated, the by-pass channel is closed, thus pressure will build up on both sides of the low pressure valve eliminating its effect, and the high pressure valve now determines the nozzle pressure.

The blocking solenoid valve of the nozzle line is of the "normally closed" type. This design ensures extremely fast response and the switching can be selected according to the burner operating sequence and is independant of motor speed. When this solenoid is non-activated, the valve is closed and all oil pressurised by the gear set passes through the regulators to suction or to the return line, depending upon pipe arrangement. As soon as this solenoid is activated, oil passes to the nozzle line at the pressure set by the pressure regulating valves.

In two pipe operation, the by-pass plug must be fitted in the return port, which ensures that the oil dumped by the regulating valves is returned to the tank and the suction line flow is equal to the gear set capacity. Bleeding in two pipe operation is automatic (it is assured by a bleed flat on the pistons), but it may be accelerated by opening a pressure port.

In one pipe operation, the by-pass plug must be removed, and the return plugged. Oil which is not required at the nozzle is returned directly to the gear inlet via the pressure regulating valves, and the suction line flow is equal to the nozzle flow. A pressure port must be opened to bleed the system.

TECHNICAL SPECIFICATIONS

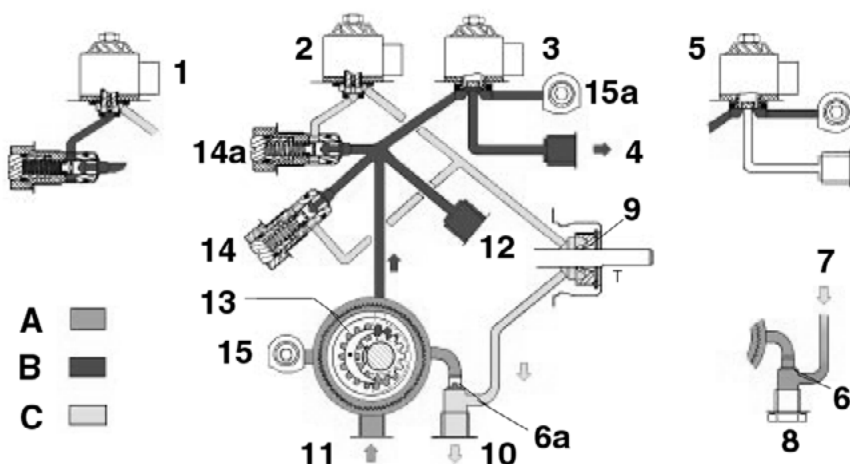
Mounting	hub mounting according to standard EN 225
Connection threads	cylindrical according to ISO 228/1
Inlet and return	G 1/4"
Nozzle outlet	G 1/8"
Pressure gauge port	G 1/8"
Vacuum gauge port	G 1/8"
Valve function	pressure regulation
Strainer:	open area: 14 cm ² (AT2 45/55/65) 20 cm ² (AT2 75/95)
opening size:	150 µm
Shaft	Ø 8 mm according to EN 225
By-pass plug	inserted in return port for two-pipe system; for one pipe system
Weight	1,3 kg

HYDRAULIC SPECIFICATIONS

Nozzle pressure range	Factory setting
Low pressure: 8-15 bar	9 bar
High pressure: 12-25 bar	22 bar
* AT2 75/95 : ppressure obtained with 10,5 GPH open nozzle	
Viscosity range	2 - 12 cSt
Max. fuel temperature.	60°C into the pump
Inlet pressure	2 bar max.
Return pressure	2 bar max.
Suction height	max. 0,45 bar to avoid air separation from oil
Rated speed	3600 rpm max.
Starting torque	0,10 N.m (AT2 45/55) -

Key

- 1 By-pass solenoid valve, closed
- 2 By-pass solenoid valve, open
- 3 Blocking solenoid valve, open
- 4 Nozzle
- 5 Blocking solenoid valve, closed
- 6 By-pass plug, removed
- 6A By-pass plug, inserted
- 7 Return to suction
- 8 Closed return
- 9 Shaft seal
- 10 Return
- 11 Suction
- 12 Pressure outlet or pressure gauge port
- 13 Gear set
- 14 High pressure adjusting screw
- 14a Low pressure adjusting screw
- 15 Vacumeter port
- A Oil under suction
- B Oil under pressure
- C By-passed oil returned to tank or to suction



SUNTEC PUMPS AS 47 - 57 - 67

Operating principle

The gear set draws oil from the tank through the built-in filter and transfers it to the valve that regulates the oil pressure to the nozzle line. All oil that does not go through the nozzle line will be dumped through the valve back to the return line in two pipe installation or, if it is a one-pipe installation, back to suction port in the gear set. In that case, the by-pass plug must be removed from the return port, and the return port sealed by steel plug and washer. The solenoid valve of the AS pump is of the "normally opened" type. When the solenoid valve is non-activated, the by-pass channel between the pressure and return sides of the valve is open. No pressure will then be built up to open the valve; it does not matter which speed the gear set has. When the solenoid is activated, this by-pass channel is closed and because of the full speed of the gear set, the pressure necessary to open the valve will be built up very rapidly, which gives a very sharp cut-on function.

Cut-off

When the burner stops, the solenoid opens the by-pass at the same moment, which drains all the oil down to the return, and the nozzle valve closes immediately. This gives a very sharp cut-off function. The cut-on and cut-off can be actuated regardless of motor speed and have an extremely fast response. When the solenoid is not activated, the torque requirement is low up to full motor speed.

Bleed

Bleeding in two pipe operation is automatic, but it may be accelerated by opening a pressure port. In one pipe operation, a pressure port must be opened to bleed the system.

Technical data

Mounting: flange or hub mounting according to EN 225.

Connection: threads cylindrical according to ISO 228/1.

Inlet and return G 1/4 (with facilities for conical sealing on revision 5 models)

Nozzle outlet G 1/8

Pressure gauge ports G 1/8

Vacuum gauge port G 1/8

Valve function Pressure regulation and cut-off*.

* cut-off function only assured for model pressure range.

Strainer open area 14 cm² - opening size: 150 µm.

Shaft: Ø 8 mm according to European standard EN 225.

By-pass plug inserted in return port for two-pipe system; to be removed with a 4 mm Allen key for one pipe system.

Weight 1,1- 1,5 kg (depending on the model).

Hydraulic Data

Gear size: Nozzle pressure range * Factory setting

47/57 7- 14 bar 9 bar; 67 10 - 15 bars 10 bar

* other ranges available on request, refer to the specified range of the particular fuel unit.

Operating viscosity 2 - 12 mm²/s (cSt)

Oil temperature 0 - 60°C in the pump.

Inlet pressure 2 bar max.

Return pressure 2 bar max.

Suction height: 0,45 bar max. vacuum to prevent air separation from oil.

Rated speed: 3600 rpm max. (AS 47, AS 57*) - 2850 rpm max (AS 67)

* except for AS 57 with code date before 000101 (pumps manufactured before Jan. 1st, 2000) = 2850 rpm max.

Torque (@ 45 rpm) 0,10 N.m (AS 47/57) - 0,12 N.m (AS67)

Solenoid valve characteristics

Voltage 220-240 or 110-120 or 24 V; 50/60 Hz.

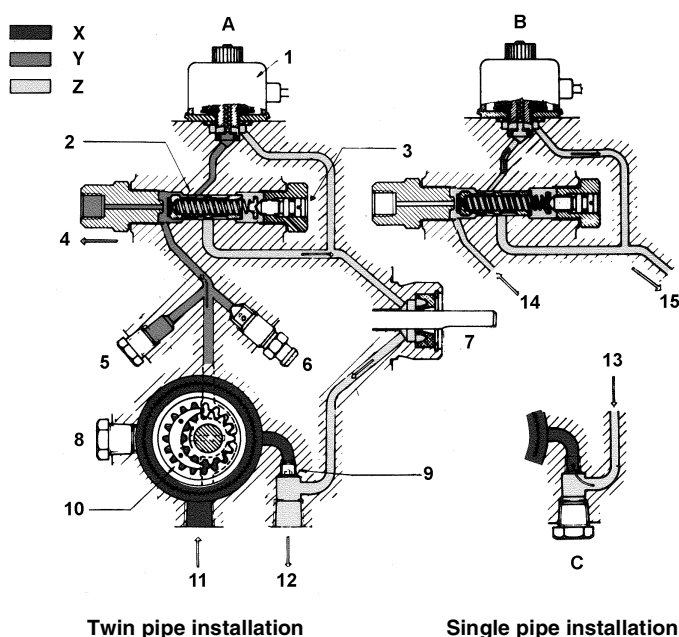
Consumption 9 V.A (@ voltage = 220 or 110 or 24 V).

Ambient temperature 0 - 60°C

Maximum pressure 15 bar

Certified TÜV Nr. stamped on pump body.

Protection class IP 41 according to IEC 529, when used with SUNTEC connector cable.



- A Closed solenoid valve
- B Open solenoid valve (NO)
- C Closed return
- 1 Solenoid valve
- 2 Pressure regulating valve
- 3 Pressure adjustment
- 4 To nozzle
- 5 Pressure gauge port
- 6 Escape valve
- 7 Shaft seal
- 8 Vacuum gauge port
- 9 By-pass plug "P"
- 10 Gear set
- 11 Inlet
- 12 Return
- 13 Back to suction
- 14 From gear set
- 15 To shaft seal and return
- X Oil under suction
- Y Oil under pressure
- Z By-passed oil returned to tank or to suction

DELTA VM PUMPS

In the VM series of DELTA pumps the pressurised flow of oil P is shut off by a built in solenoid and may therefore be switched on for startup of the motor pre-purge) or off before the motor itself switches off (flame goes out instantly when the spray from the nozzle stops).

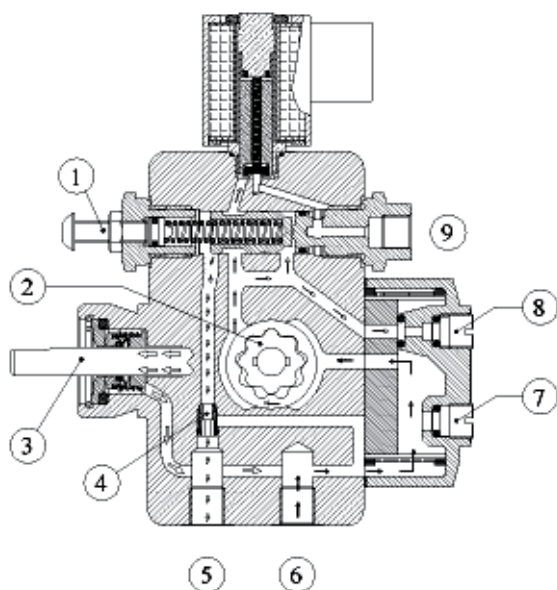
Oil pressure is regulated and kept constant by the piston valve which is activated when the light comes on to signify that the oil discharged exceeds nozzle capacity and is being returned to the tank (twin-pipe system) or being returned to the suction pipe through a bypass in the pipe (single-pipe system).

In this model both the single-pipe and twin-pipe versions have automatic priming. It is recommended that in either case a standard external filter be installed.

All twin-pipe models can be used as single-pipe systems with the simple removal of a nylon plug and by closing the return pipe.

Technical data

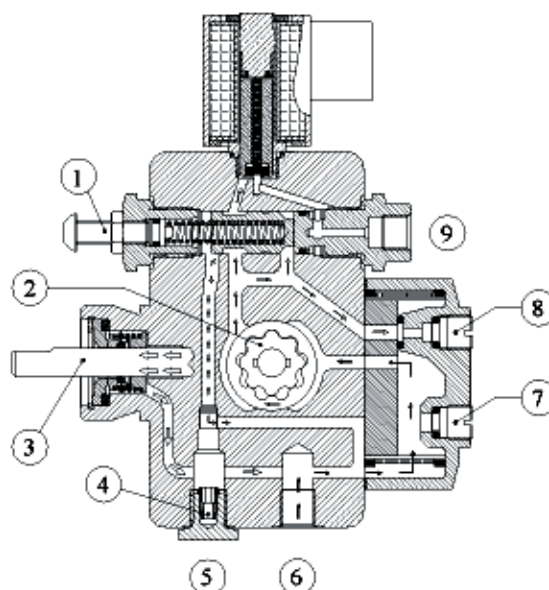
Oil viscosity	2 ÷ 50 cSt (1,1 ÷ 6,5°E)
Oil temperature	60°C (140°F) max
Suction line vacuum	0,5 bar (15 inHg) max
Suction line pressure	0,7 bar (10 psi) max
Return line pressure	1,5 bar (21 psi) max
Cut-Off pressure	4 bar
Rotation speed	3500 RPM max
Filter	Nylon cloth 150 m, 20 cm ² Optional: Stainless steel 110m, 65 cm ²
Dimensions	Hub dia. 32 mm, shaft dia. 8 mm Optional: flange hub dia. 54 mm Optional: 7/16" shaft
Connections	Inlet - Return port: G1/4" Nozzle port : G1/8" Pressure - Vacuum gauge: G1/8"
Weight	1100 gr



TWIN TUBE INSTALLATION

Key

- 1 Pressure regulator
- 2 Gear
- 3 Shaft seal
- 4 By-pass plug, mounted
- 5 Return
- 6 Suction
- 7 Vacuumometer gauge
- 8 Manometer gauge
- 9 Nozzle



SINGLE TUBE INSTALLATION

Key

- 1 Pressure regulator
- 2 Gear
- 3 Shaft seal
- 4 By-pass plug, not inserted
- 5 Return
- 6 Suction
- 7 Vacuumometer gauge
- 8 Manometer gauge
- 9 Nozzle

NOTES FOR USE AND MAINTENANCE OF FUEL PUMPS

- Make sure that the by-pass plug is not used in a single pipe installation, because the fuel unit will not function properly and damage to the pump and burner motor could result.
- 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 seal 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.
- Filter must be thoroughly cleaned at least once in a season to ensure correct working of the fuel unit. To remove the filter, unscrew the four screws on the cover. When reassemble, make sure that the filter is mounted with the feet toward the pump body. If the gasket between cover and pump housing should be damaged, it must be replaced. An external filter should always be installed in the suction line upstream of the fuel unit.



***CIB* UNIGAS**

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