SPARANDO

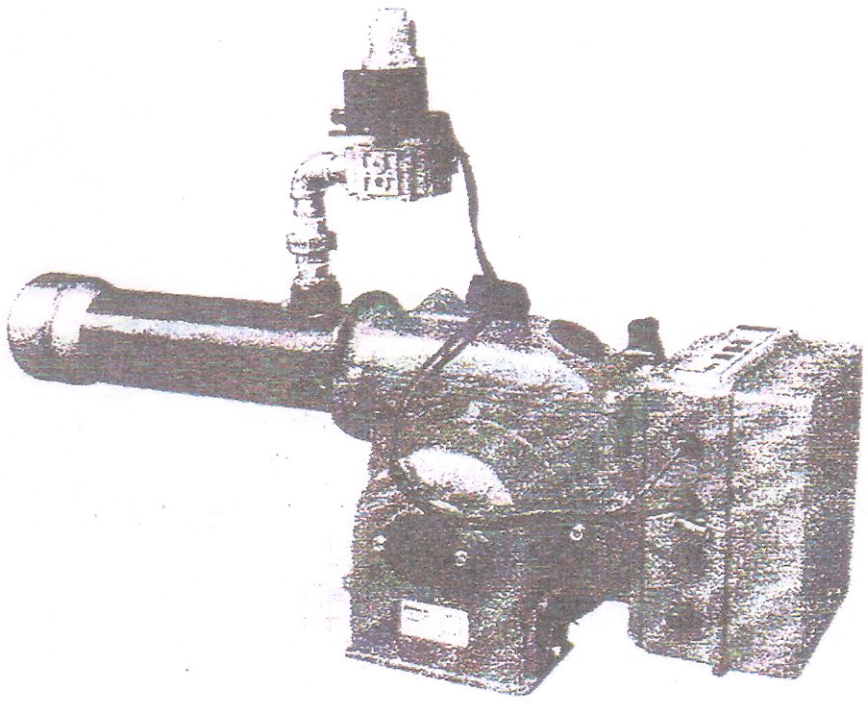
TECNOLOGIA ITALIANA

AL SERVICIO DE LA INDUSTRIA

GASMISEA

- Instruction for burners model

BG 10
BG 10T
BG 20
BG 20 T
BG 30
BG 30 T

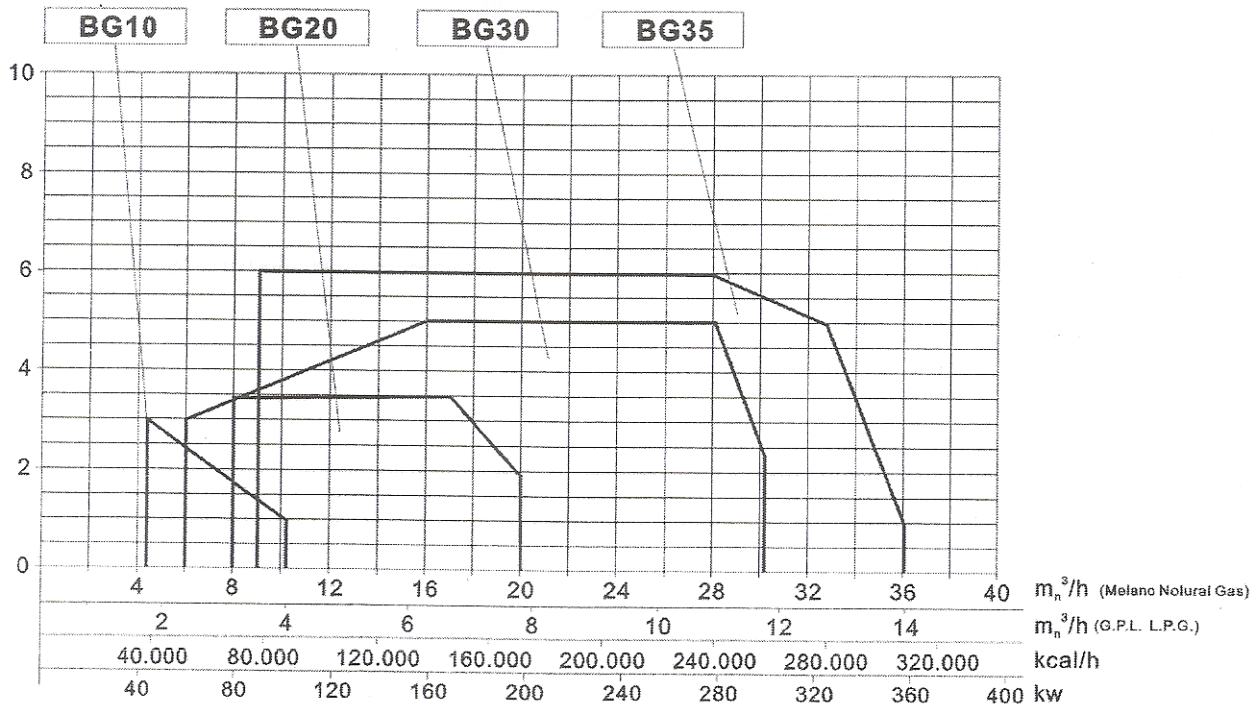


The works on the burner and on the system have to be carried out only by competent people.
Read carefully the instructions before starting the burner and service it.
The system electric feeding must be disconnected before starting working on it.
If the works are not carried out correctly it is possible to cause dangerous accidents.

INDEX

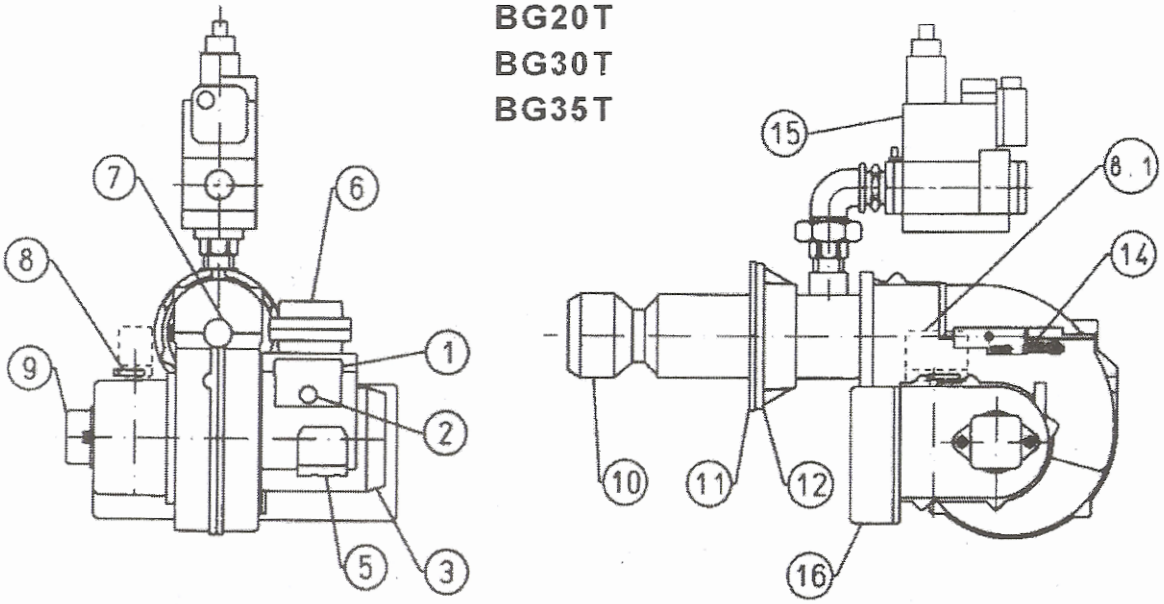
TECHNICAL DATA

		BG10-10T	BG20-20T	BG30-30T	BG35-35T
NATURAL GAS FLOW RATE	MIN m^3_n/h	4.5	5.85	6	9
	MAX m^3_n/h	12	20.1	30.2	36
L.P.G. FLOW RATE	MIN m^3_n/h	1.5	1.9	2.3	3.5
	MAX m^3_n/h	4.6	7.8	11.7	14
THERMIC CAPACITY	MIN KW	20	50	60	90
	MAX KW	45	200	300	358
NATURAL GAS PRESSURE	mbar	15÷23	15÷23	13÷19	13÷21
L.P.G. PRESSURE	mbar	30			
MOTOR	230V~50Hz	180W	250W	370W	370W
	Gir/min-r.p.m	2800	2800	2800	2800
ELECTRIC FEEDING		1N 230V - 50Hz			
IGNITION TRANSFORMER		8kV 20mA 230V - 50Hz			
CONTROL BOX		LMG 21.330B27			
WEIGHT	Kg	23	35	35	37
ACCESSORIES					
GASKET		N°1	N°1	N°1	N°1
CORD		N°1	N°1	N°1	N°1
BOLTS		N°4-M8	N°4-M8	N°4-M12	N°4-M12
NUTS		N°4-M8	N°4-M8	N°4-M12	N°4-M12
PLANE WASHERS		N°4-Φ8	N°4-Φ8	N°4-Φ12	N°4-Φ12

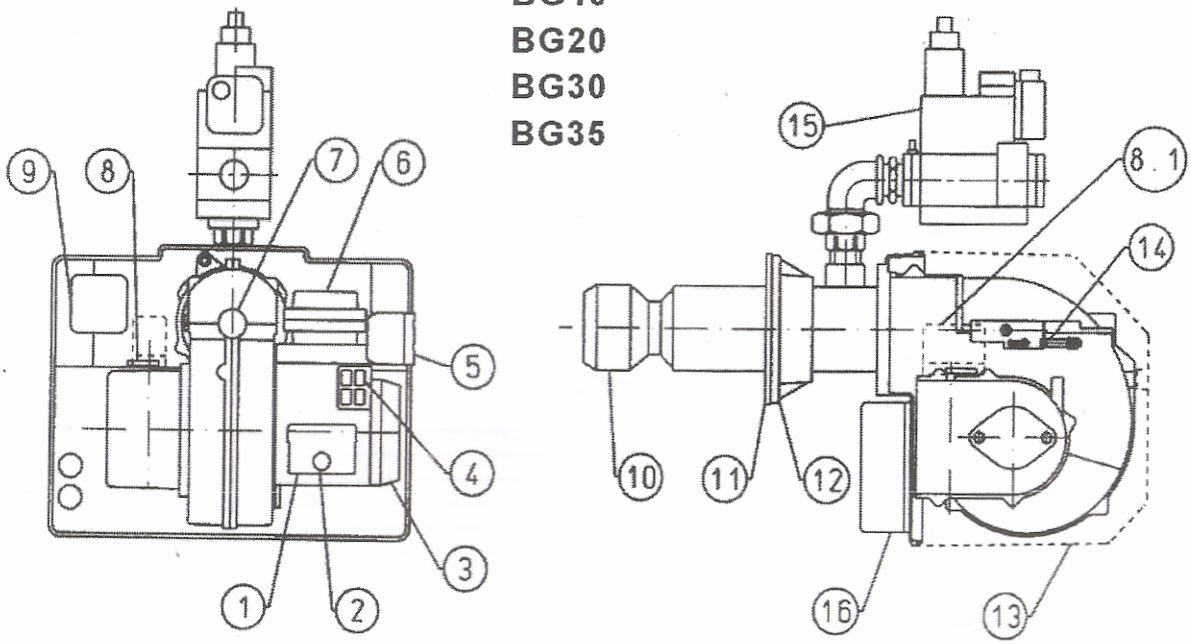


BG10 - 10T - 20 - 20T - 30 - 30T

BG10T
BG20T
BG30T
BG35T

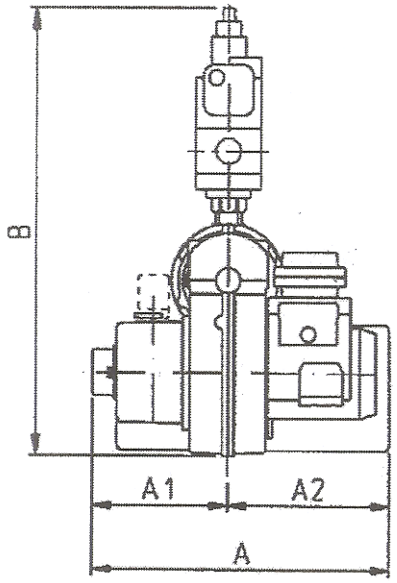


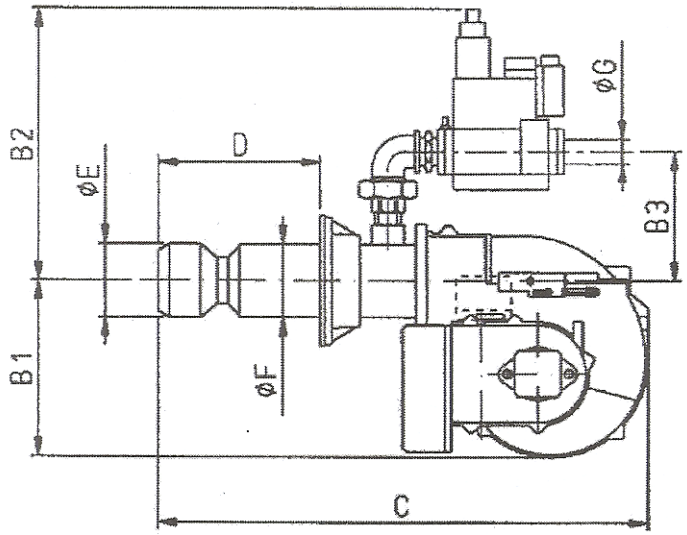
BG10
BG20
BG30
BG35

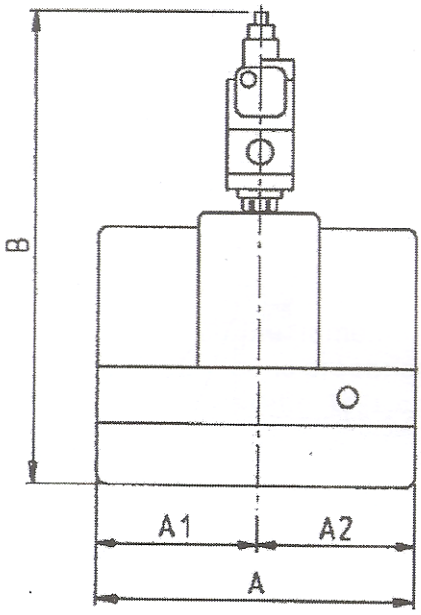


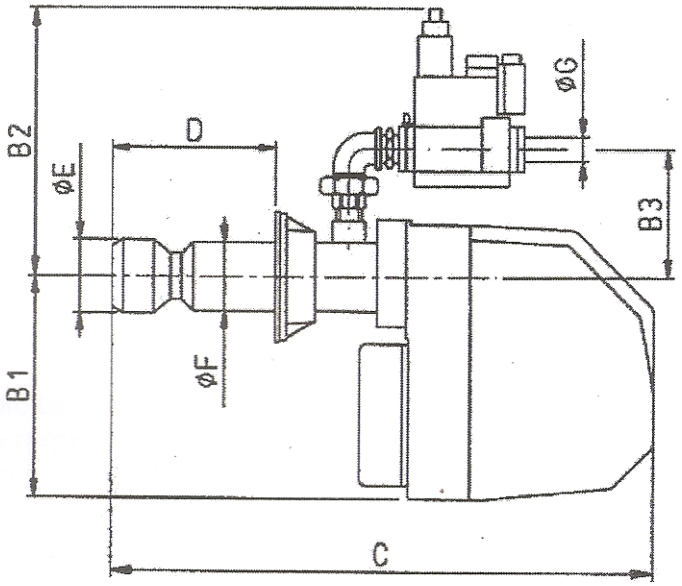
1) Control box
2) Reset button
3) Fan motor
4) Manual switch
5) Connectors
6) Ignition trasformer
7) Flame inspection window
8) Air gate regulation
9) Air pressure switch
10) Combustion head
11) Insulating gasket
12) Burner mounting flange
13) Burner cover
14) Disk head regulating screw
15) Gas electrovalve

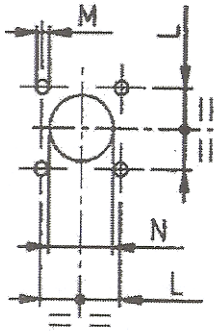
BG10 - 10T - 20 - 20T - 30 - 30T







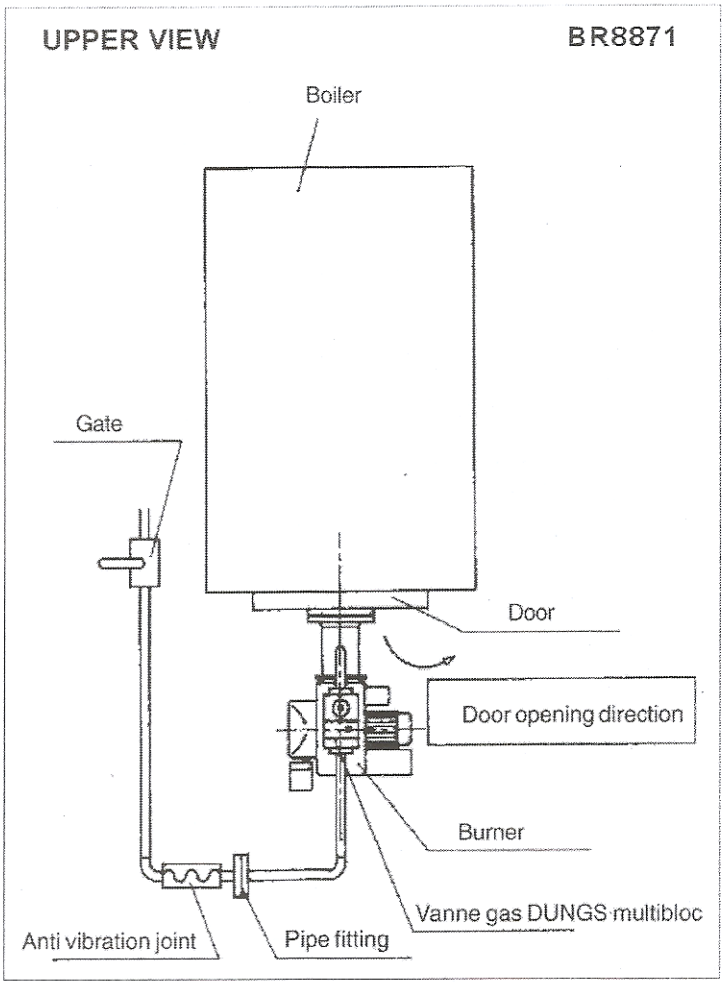




OVERAL DIMENSIONS																	
MOD.	A	A1	A2	B	B1	B2	B3	C	D		E	F	G	L		M	N
									MIN	MAX			R/p	MIN	MAX		
BG10	340	180	180	300	205	95	--	480	105	195	108	95	1/2	100	--	M8	100
BG20	490	245	245	575	275	300	170	765	120	280	126	95	3/4	105	--	M8	130
BG20T	475	230	245	563	263	300	170	740	120	280	126	95	3/4	105	--	M8	130
BG30	490	245	245	637	275	362	200	860	170	300	135	135	1"1/4	140	175	M12	150
BG30T	475	230	245	625	263	362	200	835	170	300	135	135	1"1/4	140	175	M12	150
BG35	490	245	245	637	275	362	200	965	130	300	155	135	1"1/4	140	175	M12	150
BG35T	475	230	245	625	263	362	200	925	130	300	155	135	1"1/4	140	175	M12	150

APPLICATION OF THE BURNER TO BOILER

The burner is equipped with a mounting flange which slips on the burner head. When applying the burner to the boiler, it is necessary to **correctly position** the flange so that the burner head enters the furnace **to the extent specified by the boiler manufacture.** When the burner has been correctly fastened to the boiler; proceed with connecting in to the gas pipeline. The dimensions of the gas adduction pipeline should be in function with it's length and with gas delivery according to UNI regulations. It must be perfectly hermetic and adequately tested before the burner is general inspection. It is indispensable to install a suitable pipe union in the pipeline, in proximity to the burner, to allow for easy disassembly of the burner and opening of the boiler door. The DUNGS mod. MB... valve incorporates a filter and a gas pressure stabilizer and, therefore, only a cut-off cock and an anti-vibration joint have to be fitted onto the gas adduction pipeline. Only if the gas pressure were above the maximum value allowed by regulations (400 mm. W.C.) would it be necessary to install a pressure reducer on the gas pipeline outside the heating plant. We advise installing a bend directly onto the burner gas ramp before applying the removable fitting. This layout makes it possible to open the boiler door, if there is one, after the fitting itself has been opened. The above is clearly illustrated in the following drawing
(see BR 8871).



ELECTRICAL CONNECTIONS

The electric lines should be at an adequate distance from hot parts. It is advisable to make all connections with flexible electric wire. Minimum section of conductors 1.5 mm^2.

DESCRIPTION OF OPERATIONS

By closing the main switch, and if the thermostats are closed, voltage will reach the control box and, after a short time (8 second), the burner will start up according to its pre-established programme. The fan motor will then be turned on and, when it starts functioning, it will bring about a pre -washing of the combustion chamber. Subsequently, ignition is connected and, after three seconds, the safety valve and the operating (main) valve will open. The flame appears in this way and, detected by it s own control device, it permit the continuation and completion of the ignition phase. In the case of flame failure, the control box activates a safety shut down within two seconds of the opening of the gas valves (operating and safety). When there is a safety shut down the gas valves are immediately re-closed. To unblock the control box from the safety position, push the red button on the control panel.

NATURAL GAS STARTING UP AND REGULATION (for LPG operation see the relative chapter)

In order to proceed with starting up, it's necessary, if the burner is three-phase, to check that the sense of rotation of the motor is correct. If not already done so at the moment of connecting the burner to the gas pipeline, it's indispensable to carry a purge of the air contained in the pipeline. As a precaution, special care should be taken and doors and windows should be opened. Open the pipe union on the pipeline situated near the burner and then open a little the cut-off cock (or cocks). When the characteristic odour of gas can be smelled, close the cut-off cock. Wait until the gas present in the room has dispersed, and then reconnect the burner to the gas pipeline. Then proceed as follows:

1) Make sure that the discharge of combustion products can take place freely (chimney lock-gates should be open) and that there is water in the boiler.
2) Open the combustion air regulator to the appropriate level (see bairan060, " air shutter control servo regulation, type STA 5 B 0.36/8. 2N36L") and open the air passage between the head and the flame disk (diffuser) to about a third (see regulation of the combustion head BT 8769/2 and bairan161).
3) Operate the regulators incorporated in the gas valves in such a way as to obtain the gas delivery presumed necessary.
4) Give current to the burner by opening the main switch. The burners is then turned on and carries out the preventilation phase. If the air pressure exceeds that value at which the air pressure switch has been set, the ignition transformer will be connected and, subsequently, the gas valves (safety and operating) will be inserted. The valves open completely is limited to the position at which the flow regulator incorporated in the operating valve has been manually regulated. At first ignition, successive "shut downs" could occur, due to the following reasons:
   a- The gas pipeline has not been adequately purged of air and therefore the quantity of gas is not sufficient to allow for a stable flame.
   b- A "shut down" with flame presence could be caused by flame instability in the ionisation zone, due to and incorrect air/gas ratio. This can be remedied by varying the quantity of air and/or gas delivered, in order to find the correct ratio. It could also be caused by an incorrect distribution of air/gas in the combustion head. This can be corrected by operating the regulation device of the combustion head by closing or opening more the air passage between the head and the gas diffuser. See chapter "regulation of thecombustion head".
   c- It could happen that the ionisation current is help up by the current discharged from the ignition transformer (the two currents have to run the same course on the burner's "earth") and so the burner goes to "shutdown" due to insufficient ionisation. This can be remedied by inverting the input (230V side) of the ignitiontransformer (change the places of the two wire that take voltage to the transformer). A shut down with flame presence could also be caused by the burner's casing not being properly "grounded". We must point out that the minimum value of the ionisation current to ensure the working of the control box is shown in the electrical diagram; normally the ionisation current is decidedly higher. To check the ionisation current, connect a microammeter with an adequate scale "in series" to the ionisation circuit. The cable of the ionisation electrode is equipped with a connector (see circuit diagram) to facilitate the micro-ammeter connection. The high isolation wire that comes from the electrode must be inserted to the negative (sign -) of the microammeter.
5) With the burner on, adapt delivery to that desired (methane gas = 8550 kcal/m3) by reading the meter. Take two readings, the second one exactly one minute after the first one. The difference between the two readings schould be multiplied by in order to obtain the flow per hour (60 minutes). This output can be modified by operating the special regulator incorporated in the valve (see the last pages for a desciption of how to regulate the valves).
6) Control that combustion occurs correctly by using the appropriate instruments (CO_2 = about 10% for methanegas - CO max. = 0.1%).
7) After regulation, turn the burner off and on again several times to check that ignition occurs correctly.

8) When the has started up it is necessary to check as previously shown, the gas delivery and the combustion with the appropriate instruments. When the results are known, necessary, proceed with varying the gas delivery and relative combustion air in order to adapt delivery to that required for the specific case (boilerpotentiality). It's also necessary to check if the CO2 and CO values are adequate (CO2 max. = about 10% for methane gas and CO = 0.1%).
9) Control the efficiency of the safety devices: the "shut down" (by detaching the ionisation electrode cable), the air pressure switch, the gas pressure switch, the gas pressure switch and the thermostats).

AIR REGULATION ON THE COMBUSTION HEAD (see BR 8769/2 and bairan161)

The combustion head is equipped with a regulating device which closes and opens the air passage between the disk and the head. By closing the passage it's possible to achieve high pressure upstream the disk for low inputs as well. High velocity and turbulence ensure a better penetration in the fuel, an optimum mixture and good flame stability. It might be necessary to have high air pressure upstream the disk in order to avoid flame pulsation and it's considered practically indispensable when the burner is operating with a pressurised furnace and/or thermal load. It's evident from the above, that the device which closes the air on the combustion head should be put in such a position as to **always** obtain a decidedly high air pressure value behind the disk. It's advisable to regulate in such a way as to achieve a closing of the air on the head; this will necessitate a considerable opening of the air shutter which regulates the flow to the burner's fan suction. Obviously, these adjustments should be carried out when the burner is operating at maximum delivery desired. In practice, start regulating by putting the device which closes the air on the combustion head in an intermediate position, start up the burner and make trial adjustments as previously described. **When maximum delivery desired** has been reached, proceed with correcting the position of the device which closes the air on the combustion head; move it backwards or forwards in such a way as to obtain an air flow suitable to the delivery, **with the air regulation shutter in suction considerably open**. When reducing the air passage on the combustion head, avoid closing it completely.
N.B. Check that ignition occurs regularly, because if the passage between the disk and the head is closed, it could occur that the air velocity is so high as to render ignition difficult. If this happens, gradually open the regulator until it reaches the correct position and ignition occurs regularly. This position should be definitive.

MAINTENANCE

The burner does not require special maintenance, but it is good practice to check periodically that the gas filter is clean and that the ignition electrode is efficient. It is also necessary to verify that the ignition electrode's spark is produced between the same electrode and the disk. The combustion head may need cleaning. During reassembly, special attention must be paid to centring exactly the electrodes (ignition and flame detection) in order to avoid them going to earth or short-circuiting which would result in the "shut down" of the burner.

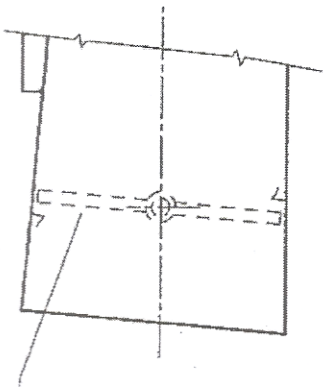
USE OF THE BURNER

The burner operates fully automatically, therefore it is non necessary to carry out any kind at adjustment during its operating. The "block" position is a safety position reached by the burner automatically when some of the components of the burners or the plant do not work properly.
It is necessary to check then whether the cause to the problem is a dangerous one before unblocking the burner.
The causes to the block may be temporary, for example when air in inside the pipes. When it is unblocked, the burner starts operating properly. If the burner stops three or four times at a stretch, it is necessary either to loock for the problem and solve it or ask for the intervention of the after sales service.
The burner can remain in the "block" position without any limit in time.
In emergency cases it is advisable to close the fuel valve, and to disconnect the burner electrically.

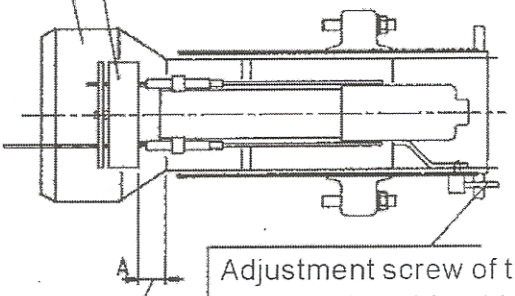
AIR REGULATION PRINCIPLE DIAGRAM FOR GAS BURNER

BR8769/2

NOT CORRECT ADJUSTMENT



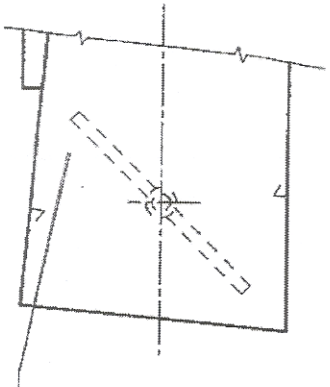
Air combustion in-let gate very closed



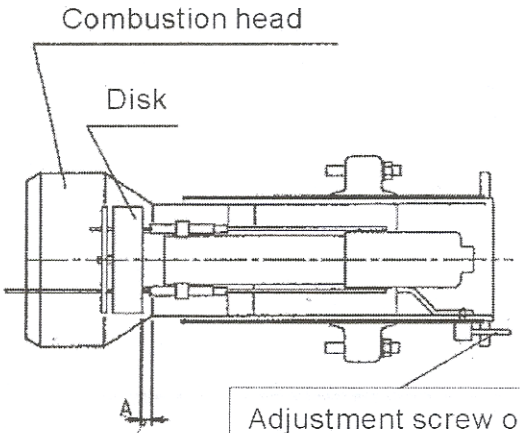
Air passage big opening

Adjustment screw of the disk-head position (tighten in order to open the air passage between the disk and the head, unscrew to close)

CORRECT ADJUSTMENT



Air combustion in-let gate considerably opened

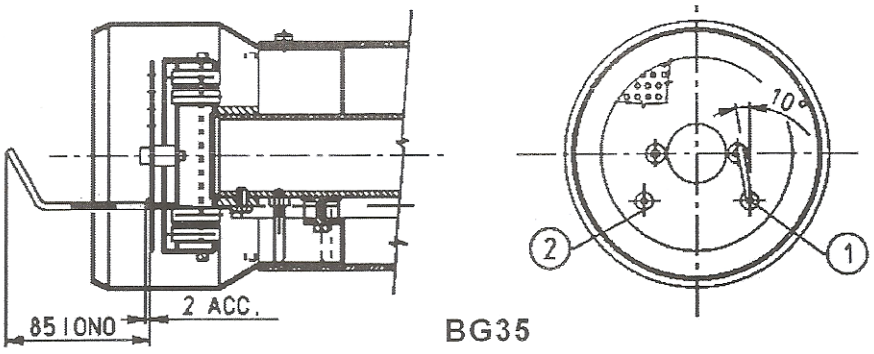


Air passage fairly closed.
ATTENTION:
avoid the total closing

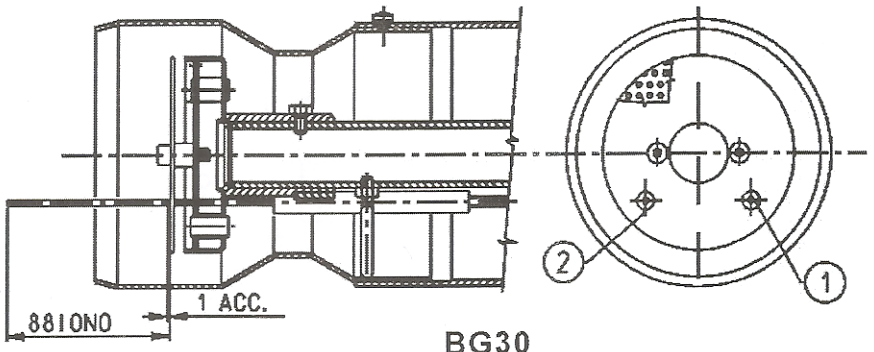
Adjustment screw of the disk-head position (tighten in order to open the air passage between the disk and the head, unscrew to close)

AIR REGULATION AND ELECTRODES-DISK POSITIONING PRINCIPLE DIAGRAM

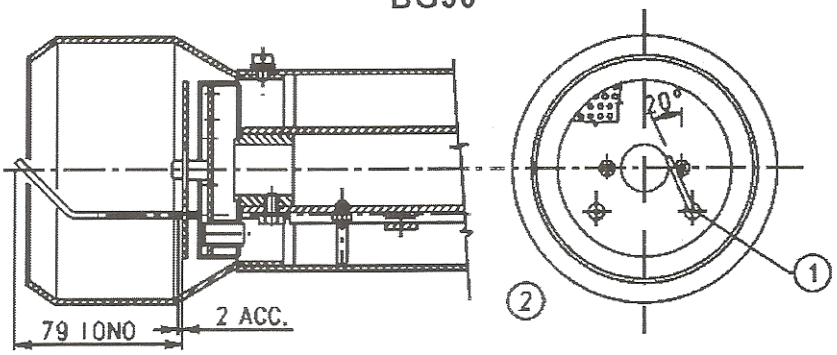
bairan162



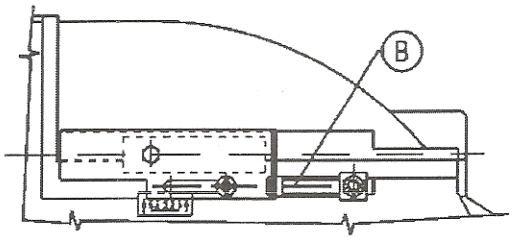
BG35

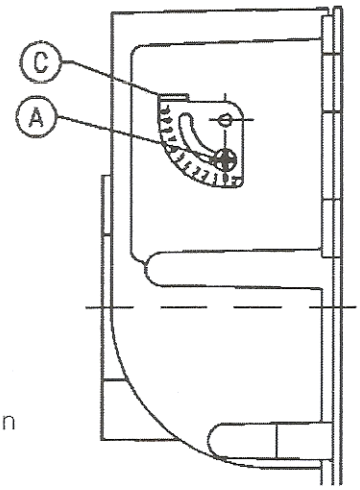


BG30



BG20
BG10





A Air gate fixing screw
B head-disk adjustment screw (tighten to open the head-disk air passage, loosen to shut)
C Air suction regulator
1 Ionizing electrode
2 Ignition electrode

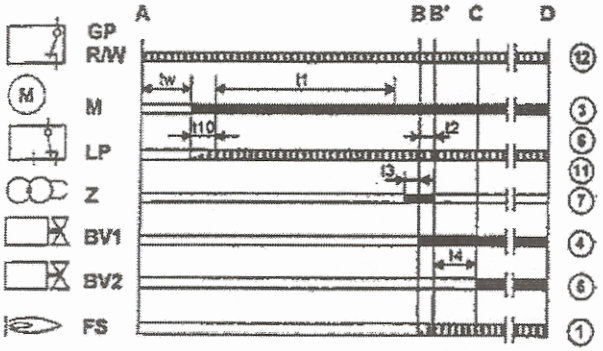
GAS BURNER CONTROLS

for small to medium capacity burners with or without a fan (intermittent operation*)

Function diagrams

LGB21.../ LGB31

Burners controls for single-or two-stage forced draught burners: Air damper control for pre-purge with **low flame** air volume. The LGB21...is also sutable for natural draught burners and for ignition spark proving.

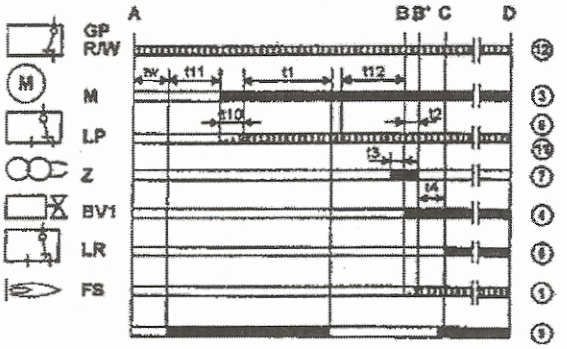


Wiring examples

Air damper of two-stage or modulating burners. Pre-purge (t1) with low flame air volume.

LGB22.../ LGB32

Burners controls for single-or two-stage forced draught burners: Air damper control for pre-purge with **high flame** air volume.



Wiring examples

Air damper of two-stage or modulating burners. Pre-purge (t1) with high flame air volume (nominal load).

Control boxes timing

Flame detector type	Type reference	Approved in:	tw/s ap.	t1/s min.	t2/s max.	t3n/s ap.	t3/s ap.	t4/s ap.	t5/s[9] max.	t10/s min.	t11/s[3] max.	t12/s[3] max.	t20/s ap.
Burner controls with air damper control for pre-purge with low flame air volume													
Detector electrode (FE) or UV detector QRA... with/without ignition spark proving	LGB21.130A27[4)7)]	CH,EU,S,SF	8	7	3	2,4	2	8	–	5	–	–	6
	LGB21.230A27[5)]	CH,EU,S,SF	8	15	3	2,4	2	8	–	5	–	–	38
	LGB21.330A27[5)]	CH,EU,H,S,SF	8	30	3	2,4	2	8	–	5	–	–	23
	LGB21.350A27[5)7)]	CH,EU,H,S,SF	8	30	5	4,0	2	10	–	5	–	–	21
	LGB21.550A27[5)]	AUS,CH,EU	8	30	5	4,0	2	10	–	5	–	–	2
Blue flame detector QRC1...	LGB31.230A27	CH,EU	8	15	3	2,4	2	8	–	5	–	–	38
Burner controls with air damper control for pre-purge with high flame air volume (nominal load)													
Detector electrode (FE) or UV detector QRA...	LGB22.130A27[4)]	CH,EU,N,S	9	7	3	2,4	3	8	–	3	12	12	21
	LGB22.230A27[5)]	CH,EU,N,S,SF	9	20	3	2,4	3	8	–	3	16,5	16,5	2
	LGB22.330A27[5)7)]	AUS,CH,EU,H,N,S,SF	9	30	3	2,4	3	8	–	3	12	11	2
	LGB22.330A270[5)8)]	EU	9	30	3	2,4	3	8	–	3	12	11	2
Blue flame detector QRC1...	LGB32.130A27[4)]	CH,EU	9	7	3	2,4	3	8	–	3	12	12	21
	LGB32.230A27[5)]	CH,EU	9	20	3	2,4	3	8	–	3	16,5	16,5	2
	LGB32.330A27[5)7)]	CH,EU	9	30	3	2,4	3	8	–	3	12	11	2
Burner controls for natural draught burners													
Detector electrode (FE) with/without ignition spark proving	LGB41.258A27[2)5)7)]	CH,EU,H,SF	18	–	5	4,0	2	10	9	–	–	–	–

Legend

- tw Waiting time
- t1 Checked pre-purge time
- t2 Safety time
- t3n Post-ignition time
- t3 Pre-ignition time
- t4 Interval BV1-BV2 or BV1-LR
- t5 Second safety time (only with LGB41...)
- t10 Specified time for air pressure signal
- t11 Programmed time for opening actuator SA
- t12 Programmed time for closing actuator SA
- t20 Interval up to self-shutdown of the programming mechanism

2) For natural draught burners up to 120 kW
3) Maximum running time provided for the air damper actuator
4) For flash steam generators
5) Also for stationary direct fried air heaters
7) Also available for 100... 110 V;
in that case, the last two digits read ...17 in place of ...27
8) Without integral microfuse. Use only in connection with a base AGK86... or with an external microfuse of 6.3A (slow)
9) t5 = reaction time of flame relay

* For safety reasons (self-test of flame supervision circuit, etc.), at least one controlled shutdown must take place every 24 hours

GAS BURNER CONTROLS

for small to medium capacity burners with or without a fan (intermittent operation*)

Conditions for burner startup:

- Burner must be reset
- The contacts of the gas pressure switch "GP", of the thermal reset limit thermostat or pressure switch "W" and of the control thermostat or pressure regulator "R" must be closed.

Startup program

A-C Startup program.

A **Start command** (coontrolled startup)
This command is initialed by "R". Terminal 12 receives voltage and the programming mechanism starts. After the waiting time "tw" with the LGB21... has lapsed and after the actuator SA has moved the air damper to the high flame position (that is, on completion of "t11") with the LGB22..., the fan motor for the pre-purge will be started.

tw **Waiting time**
During this period of time, the air pressure switch and the flame relay are tested for correct contact positions. With some types, an additional check is made to ensure that the fuel valves are closed (refer to "Wiring Diagrams").

t11 **Programmed opening time for actuator SA**
(Only with the LGB22...): the fan motor is started only after the air damper has reached the high flame position.

t10 **Specified time for air pressure signal**
On completion of this period of time, the set value of air pressure must have built up, or else lockout will be initiated.

t1 **Pre-purge time**
Purging the combustion chamber and the secondary heating surfaces: with low flame air volume with the LGB21... and with high flame air volume (nominal air volume) with the LGB22....
Under "Summary of Types", "Function Diagrams" and "Diagrams of Programming Mechanism", the so-called pre-purge time "t1" is shown, during which the "LP" must signal that the required air pressure has built up. The effective pre-purge time comprises the interval "End of tw/beginning of t3".

t12 **Programmed closing time for actuator SA**
(Only with the LGB22...): during "t12", the air damper travels to the low flame position.

t3n **Post-ignition time**
Ignition time during the safety time. Just before reaching the end of the safety time "t2", the ignition transformer is switched off. This means that the ignition time "t3n" is somewhat shorter than the safety time "t2". This is necessary in order to give the forcedly closed flame relay sufficient time to drop out if there is no flame.

t3 **Pre-ignition time**
During this period of time and up to the end of the safety time "t2", the flame relay is forced to close. On completion of "t3", fuel release is initiated at terminal 4 or at terminal 11 of the LGB41....

t2 **Safety time**
On completion of "t2", there must be a flame signal at input 1 of the flame signal amplifier, which must be present uninterruptedly until controlled shoutdown occurs, or else the flame relay will be de-energized, the burner control will initiale lockout and remain blocked in the fault position.

t4 **Interval**
LGB21...: time to the release of the second fuel valve
LGB22...: on completion of "t4", the heat generator is controlled in function of the load (enabling of load controlle)
LGB41...: time to the release of the second fuel valve

t5 **LGB41... Second safety time** for pilot burners with main flame supervision equipped with a pilot gas valve ZV1

B-B' **Interval for flame establishment**

C **Running position of burner reached**

C-D **Burner operation** (heat generation)
High flame operation or, in connection with a load controller, partial load.

D **Controlled shutdown "R"**
The burner is immediately shut down and the programming mechanism is ready for a new start.

Control program in the event of faults
Basically, if there is a fault, the fuel supply is immediately shut down.
If the fault condition occurs at a time between start and pre-ignition, which is not indicated by symbols, the cause is usually the air pressure switch "LP" shutting down, or a premature (that is, faulty) flame signal.

- **After a mains voltage failure or in the event of undervoltage:** startup repetition with unabridged program.
- **In the event of a premature flame signal from the start of the pre-purge time:** immediate lockout.
- **In the event the contacts of the air pressure switch "LP" have welded during "tw":** no start.
- **If there is no air pressure signal:** lockout on completion of t10.
- **If the event of an air pressure failure on completion of "t10":** immediate lockout.
- **If the burner does not ignite:** lockout on completion of "t2".
- **If flame is lost during operation:** immediate lockout.
- **For ignition spark proving with the QRE:** if there is no ignition spark signal, the valves will remain closed and lockout will take place on completion of "t2".

Resetting the burner control:
The burner control can immediately be reset after each lockout, without changing the program sequence.

Lockout and Control Program Indicator
The position of the cam can be viewed through the window on the front of the burner control. In the event of a fault, the program mechanism is stopped and thus the lockout indicator also.
The symbol visible on the cam indicates both the position in the program sequence and the type of fault according to the following legend:

◀ no start because the start control loop is interrupted

		interval tw or t10 (LGB21) interval tw or t11 (LGB22) interval tw, t3 or t2 (LGB41)

▲ air damper fully open (LGB22)

P lockout due to absence of air pressure signal (LGB21); air damper not open (LGB22)

◀▬▶ intervals "t1", "t3" and "t2" (LGB21)
intervals "t1", "t3" and (t12) (LGB22)

▼ release of fuel (LGB22)

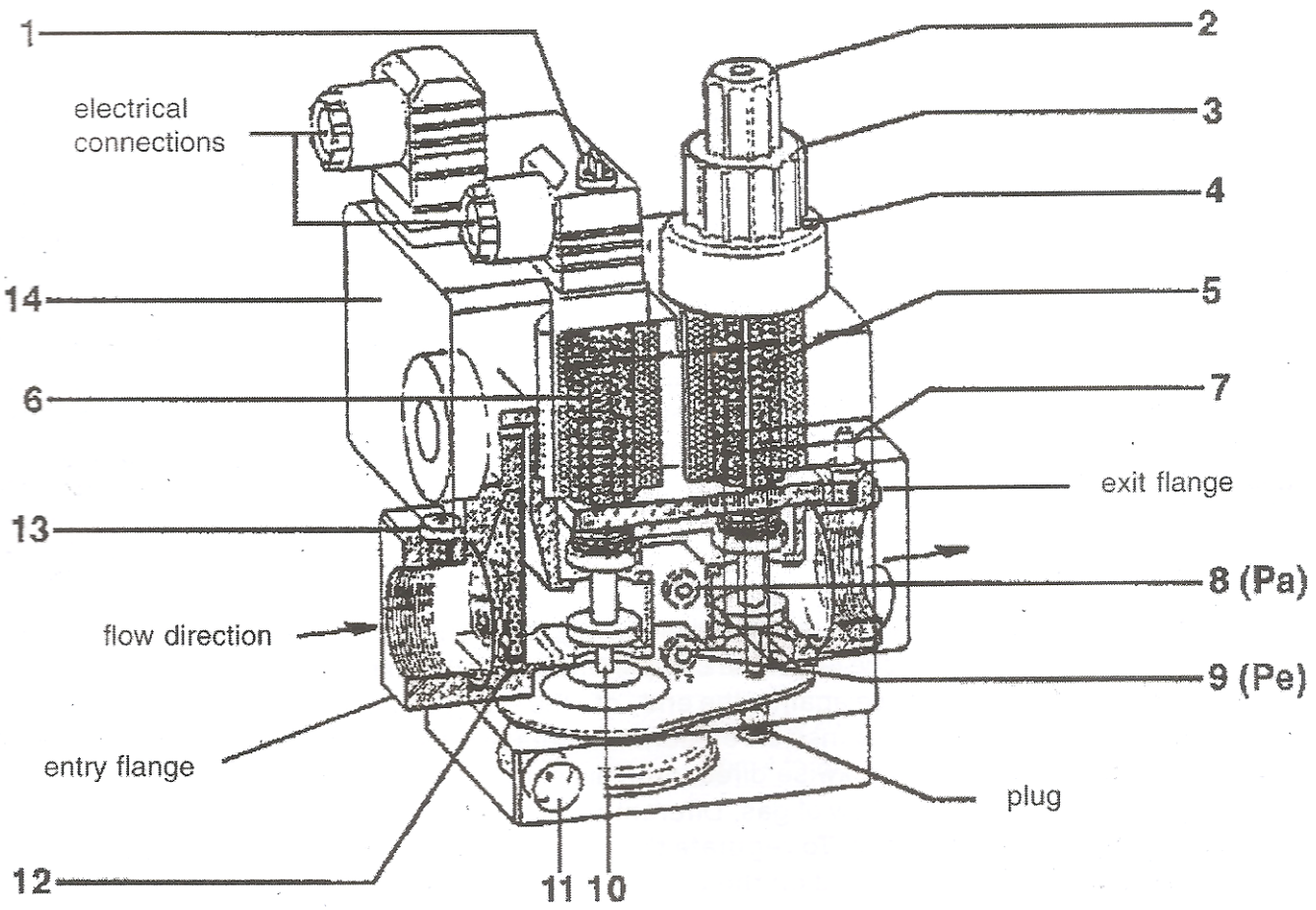
1 lockout because there was no flame signal on completion of the first safety time

2 enabling the second fuel valve (LGB21, LGB41)
enabling the load controller (LGB22)

3 lockout because there was no flame signal on completion of the second safety time (LGB41)

● ● ● low or high flame operation (or return to the running position)

COMBINED DUNGS VALVE (monobloc)
mod.MB-DLE...B01



1 - Acces to stabilizer regulating screw (only for version B01)
2 - Acces knob for manoeuvring ignition output regulator
3 - Regulating knob for maximum delivery
4 - Locking screw for regulating knob
5 - Principle valve (2-stage opening)
6 - Safety valve (rapid)
7 - Pressure tap (to control pressure in exit from valve)
8 - Pressure tap (to control pressure in exit from stabilizer (Pa)
9 - Pressure tap (to control pressure at valve entry (Pe)
10 - Pressure stabilizer (only for version B01)
11 - Pressure stabilizer bleed (only for version B01)
12 - Small entry filter
13 - Pressure tap (to control pressure at valve entry)
14 - Minimum pressure switch

COMBINED DUNGS VALVE (monobloc) mod.MB-DLE...B01

The gas valve unit **DUNGS MB - DLE...** is made up of:

1) A safety valve which closes opens rapidly.

2) A principle valve which opens in two stage (5). The first opening stage occurs rapidly (release) and is adjustable by unscrewing the knob (2) and inserting the back part of the regulating pin underneath. The + and symbol can be seen on the head of the valve and these indicate the direction in which the pin should be turned in order to increase or the ignition output (the first stage of the valve opening). By rotating in a clockwise direction, the initial delivery (ignition flame) can be reduced; in an anti-clockwise direction, the initial delivery is increased. The complete run from zero to maximum, and viceversa, is slightly more than three turns (40% of the total opening). When the first opening stage has taken place, the valve comtinues to open slowly and takes 15 seconds to reach the maximumopen position. To regulate maximum delivery desired, loosen the locking screw (4) (the one with the protruding head and not the one locked and sealed with paint) and turn knob (3). Rotate in a clockwise direction to reduce delivery and in anti-clockwise direction to increase it. It should be pointed out that when the regulating knob is turned, the end - of - the - run which limits the operating of the valve moves; therefore, when the knob has been turned untilit reaches the - sign, the valve will not open and the burner will not ignite. To get ignition, it's necessary to turn the knob in an anticlockwise direction towards the + sign. The complete run from zero to maximum and viceversa is neary six turns of the knob. This regulating operation (for maximum and ignition output) must be carried out without forcing against the end - of - the - run - positions.

3) The pressure stabilizer (10) can be regulated (see table) by manoeuvring the screw which can be reached by sliding the cover (1) to one side. The complete run from the maximum to the position and viceve rsais about 80 turns. Do not force against the end - of - the - run positions. Around the screw are arrows with symbols which indicate the sense of rotation: to increase pressure, rotate in a clockwise direction, to reduce it, rotate in an anti-clockwise direction. This stabilizer hermetically closes "upstream" and "downstream" when there is no flow of gas. Dfferent springs to obtain different pressure value from those described above are not foreseen. **To regulate the pressure stabilizer, connect a water manometer to the rubber tube holder installed on the tap (8) in correspondence with the exit of the stabilizer.**

4) The small entry filter (12) can be reached for cleaning by removing one of the two side closing plates.

5) The minimum pressure switch (14) and the maximum pressure switch (15). To regulate it remove the transparent cover and operate the black knob. The reference mark is the small rectangle to be found on the yellow disk which the regulating knob rotates around.

6) At entry, a tap (13) has been fitted to the connction flange to measure the entry pressure. At the exit of the connection flange, there is also a tap (7) to measure the pressure in exit.

7) The side pressure taps (9), indicated as Pe, are in communication with the entry pressure.

8) The side pressure taps (8) indicated as Pa, are used to measure the pressure coming out of the stabilizer. It might be useful to know, that the pressure coming out of the valve unit (to be measured at tap 7), corrisponds to the pressure regulated by the stabilizer and is reduced in order to overcome the crossing resistance of the principle valve (5). It should be pointed out, that the valve crossing resistances depend on the opening of the valve regulated by knob 3 through wjich the end - of - the - run position is adjusted. **To regulate the pressure stabilizer, connct a water manometer to the rubben tube holder installed on tap (8) in correspondence to the stabilizer exit (Pa).**

9) The holes of the pressure stabilizer bleed (11) should be free and unblocked if it's to function properly.

COMBINED DUNGS VALVE (monobloc) mod.MB-DLE...B01

SUGGESTIONS FOR REGULATING THE GAS VALVE

1) Connect a water manometer to the pressure tap Pa (indicated as n' 8) to measure the pressure coming out of he stabilizer.

2) Put the gas delivery regulators for ignition (2) and for maximum delivery (3) in the positions presumed necessary for the delivery desired. Also open adequately the combustion air regulator.

3) Turn on the burner.

4) With the burner on, manoeuvre the regulating screw (1) of the stabilizer regulator of the gas pressure and regulator of the gas pressure and regulate the pressure at the value considered necessary to obtain the output desired, when the maximum output regulator (3) is in the maximum opening position. It should be pointed out that, normally, the above conditions require about 40 ÷ 70 mm.W.C.

5) Put the ignition output regulator (2) in the position considered necessary to obtain ignition with the minimum delivery possible.

VALVE MODEL	INLET MAX PRESSURE (PE) mbar	ADJUSTTABLE OUTLET PRESSURE FROM THE STABILIZER (PA) mbar	TYPE OF GAS
MB...403 B01 S 20	200	from 4 to 20	Natural gas / L.P.G.
MB..... B01 S 20	360	from 4 to 20	Natural gas / L.P.G.

NOTES ON USE OF PROPANE (L.P.G.)

We think it would be useful to inform you on a few points regarding use of liquid propane gas (L.P.G.).

1) Approximate evaluation of running costs

a) 1 m_3 of liquid gas in gaseous state has heating power inferior by about 22.000 kcal.

b) to obtain 1 m_3 of gas about 2 kg of liquid gas are required. This is equal to about 4 litres of liquid gas. According to the above, it can be deduced that by using liquid gas (L.P.G.) the following approximate equivalence is obtained:
22.000 kcal = 1 m_3 (in gaseous state) = 2 kg of L.P.G. (liquid) = 4 litres L.P.G. (liquid). From this, running costs can be calculated.

2) Safety measures

Liquid gas (L.P.G.) has, in it gaseous state, a specific gravity superior to that of air (specific gravity of propane gas in relation to air = 1,56) and therefore does not disperse in air like natural gas, which has a lower specific gravity (specific gravity of natural gas in relation to air = 0,60), but precipitates and spreads at ground level as if it were a liquid. In view of the above principle, the Ministero dell'Interno (Home Office) has set limitations for use of Liquid Gas in circular n° 412/4183 of 6 February 1975. We will look into the points we think most important:

a) Liquid Gas (L.P.G.) for burners and/or boilers can only be used in rooms above ground and overlooking open spaces. Installations using liquid gas in basements or cellars are not permitted.

b) Rooms where liquid gas is used must have ventilation inlets without closing devices, located on external walls with a surface of at least 1/15 of the room's area and a minimum of 0,5 m_2.
At least one third of the entire surface of these inlets must be located in the lower part of the external wall, flush with the floor.

3) Requirements for liquid gas plant to ensure correct operation and safety

Natural gasification, from cylinder unit or tank, can only be used for low power plant. Supply capacity at gaseous stage, depending on tank dimensions and minimum external temperature, is shown in the following table but only as a rough guide.

Minmum temperature	- 15°C	- 10°C	- 5°C	- 0°C	+ 5°C
Tank 990 l.	1.6 Kg/h	2.5 Kg/h	3.5 Kg/h	8 Kg/h	10 Kg/h
Tank 3000 l.	2.5 Kg/h	4.5 Kg/h	6.5 Kg/h	9 Kg/h	12 Kg/h
Tank 5000 l.	4 Kg/h	6.5 Kg/h	11.5 Kg/h	16 Kg/h	21 Kg/h

4) Burner

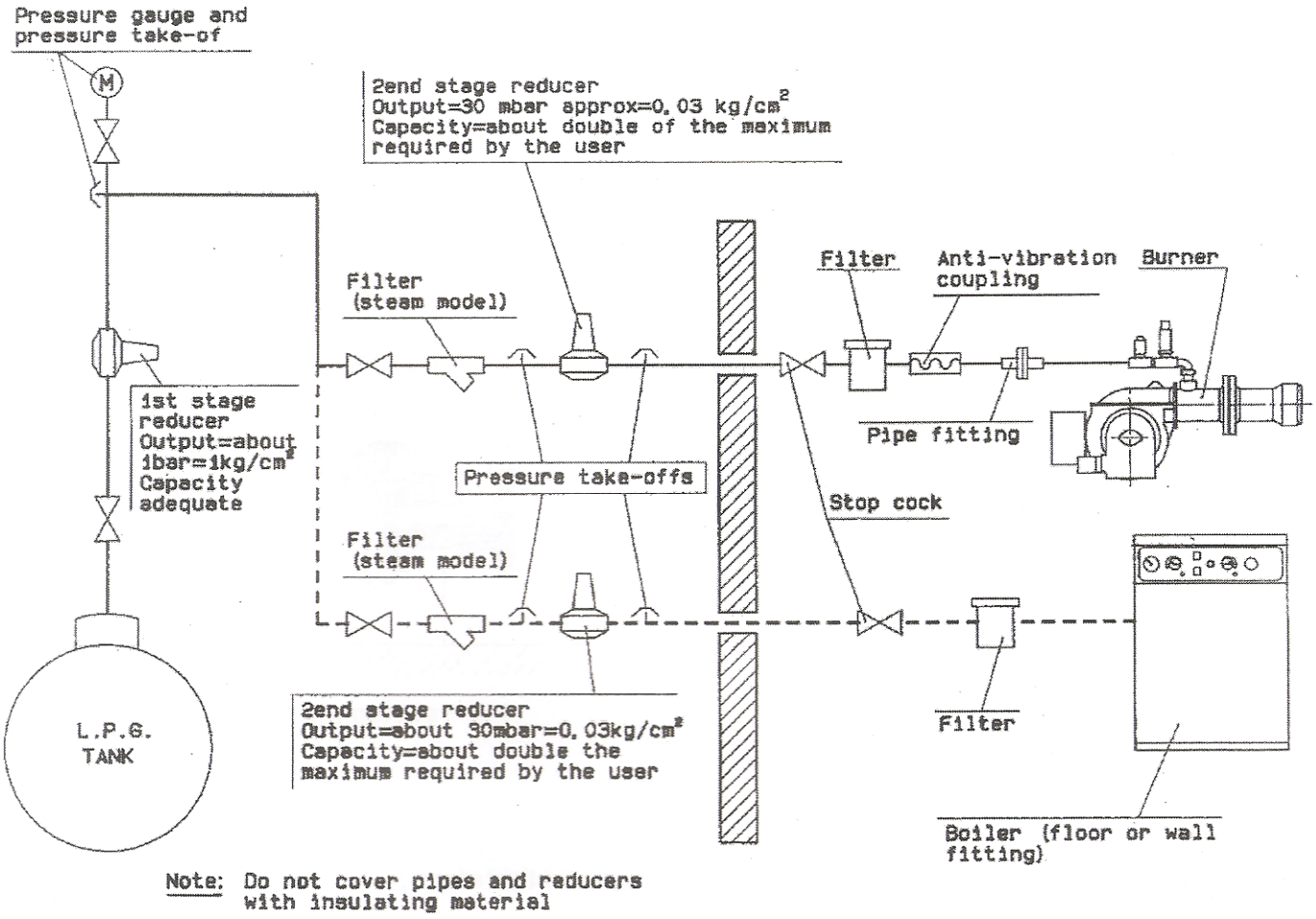
The burner must be ordered specifically for use with liquid gas (L.P.G.) so that it is equipped with gas valvesof sufficient dimensions to ensure correct ignition and gradual regulation.
Our valves have dimension is planned for use at a supply pressure of about 300 mm.W.C. We suggest gas pressure be checked at the burner by using a water column pressure gauge.
N.B. Maximum and minimum burner pressure (kcal/h) obviously remains that of the original natural gas burner (L.P.G. has heating power superior to that of natural gas. Therefore, in order to burn fully, it requires air quantity in proportion to the thermal power created).

5) Combustion control

To limit consumption and avoid serious trouble, adjust combustion by using the appropriate instruments. It is absolutely essential to check that the percentage of carbon monoxide (CO) does not exceed maximum permitted value of 0,1 % (use the combustion analyser). Please note that our guarantee does not cover burners operating on liquid gas (L.P.G.) in plant for which the above measures have not been taken.

GENERAL DIAGRAM FOR TWO-STAGE L.P.G. PRESSURE REDUCTION FOR BURNER OR BOILER

BR8721/

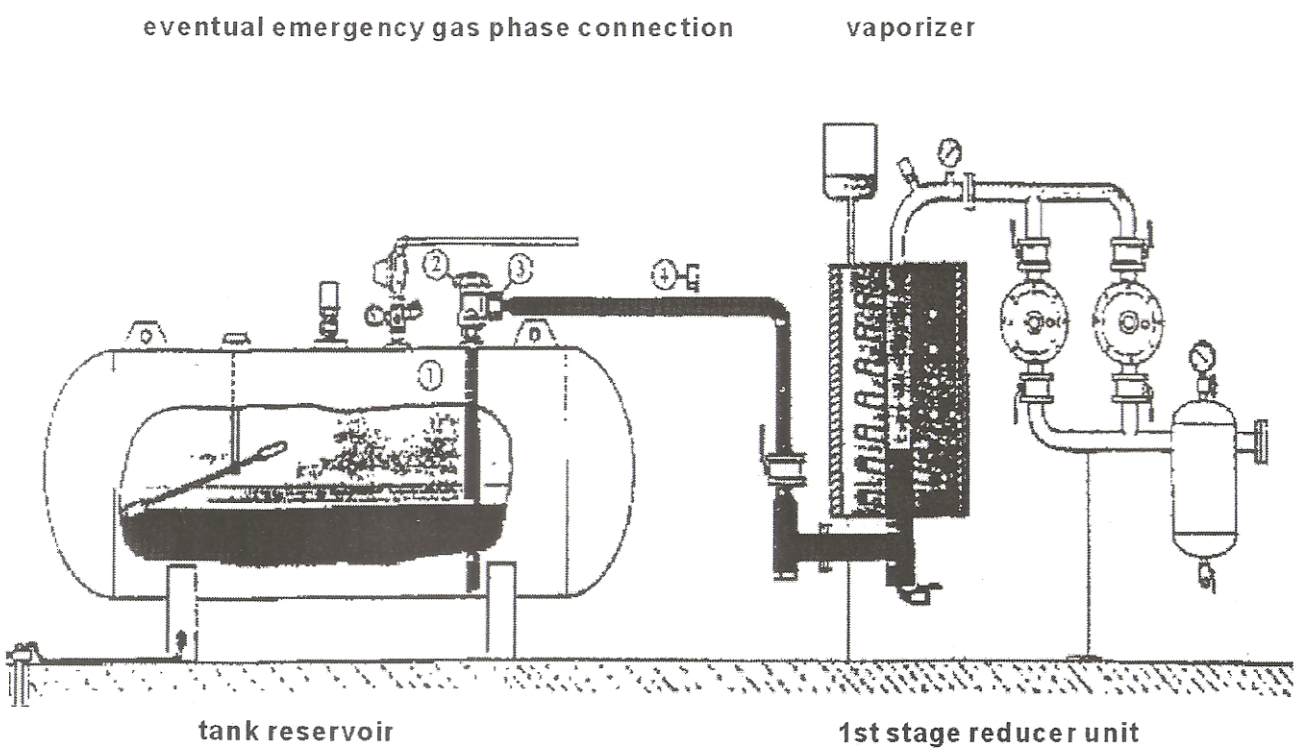


Note: Do not cover pipes and reducers with insulating material

OPERATING ANOMALY

TYPE OF IRREGULARITY	PROBABLE CAUSE	RIMEDY
The burner does not start.	1) Lack of currente. 2) Gas does not reach the burner.	1) Check the fuses of the feed line. Check the fuses of the control box. Check the line of the thermostats and the gas pressure switch. 2) Check the opening of the detecting devices located along the feeding pipes.
The burner starts but the flame does not ignite. The burner stops consequently.	1)The gas valves do not open. 2) There is no spark at the electrode. 3) The air pressure switch does not give it's consent to the co ntrol box.	1) Check the valves operation. 2) Check the operation of the ignition transformer. Check the position of the electrodes ends. 3) Check the setting and operation of the air pressure switch.
The burner starts and the flame ignites then the burnes stops.	1) The control electrode does not detect or detects the flame improperly.	1) Check the position of the control electrode. Check the valve of the ionisation current.

LAYOUT DIAGRAM WITH VAPORISATION



Warnings

- The vaporizer is considered a dangerous point and should therefore be situated at asafe distance from any building.
- The electrical system must be AD-EP (anti-deflagration-explosion proof).
- The L.P.G. pipelines must be made of SS steel with welded or flanged joints NP 40 (nominal pressure 40 bar). Threaded joints are prohibited.

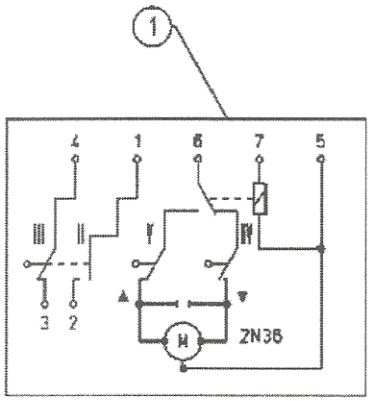
Specific materials

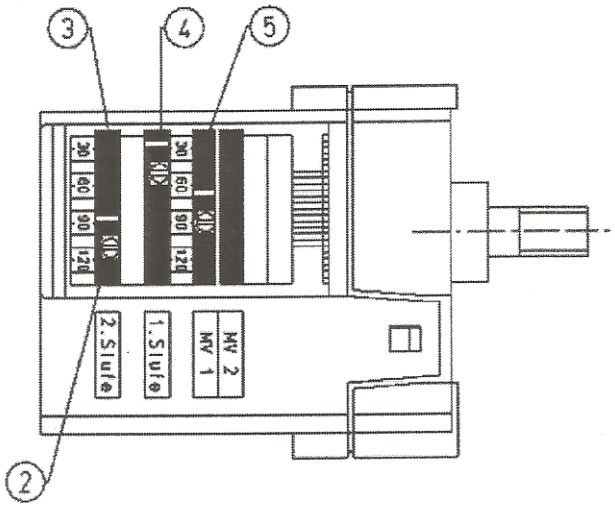
1) Liquid recovery valve.
2) Liquid delivery cock with flow limiter.
3) Steel fitting with welded tang and copper washer.
4) 18 bar safety valve with welded steel fitting.

ADJUSTMENT DIAGRAM FOR SERVOMOTOR

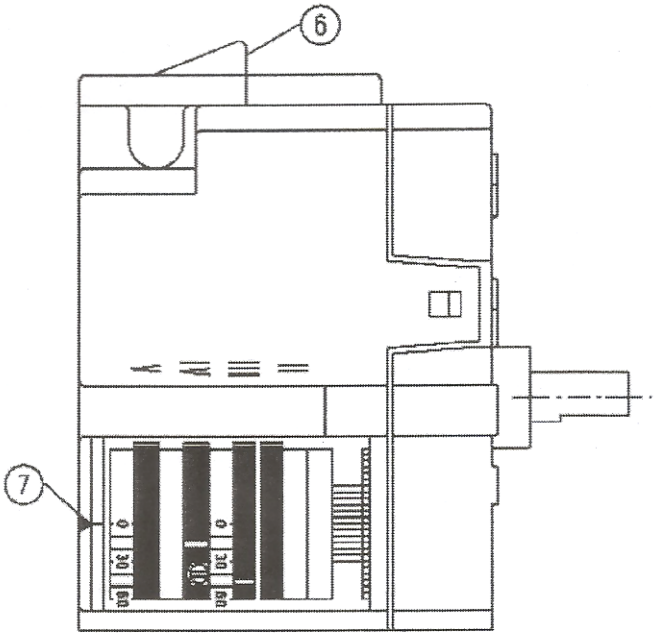
BERGER STA 5 B0. 36/8 2/N 36L PREVENTILATION WITH AIR OPEN IN 1ST FLAME POSITION

TO MODIFY THE ADJUSTMENT OF THE CAMS USE THEIR SCREWS. THE MARK OF THE RED RING INDICATES THE ROTATION ANGLE ON THE REFERENCE SCALE. SET FOR EACH CAM.

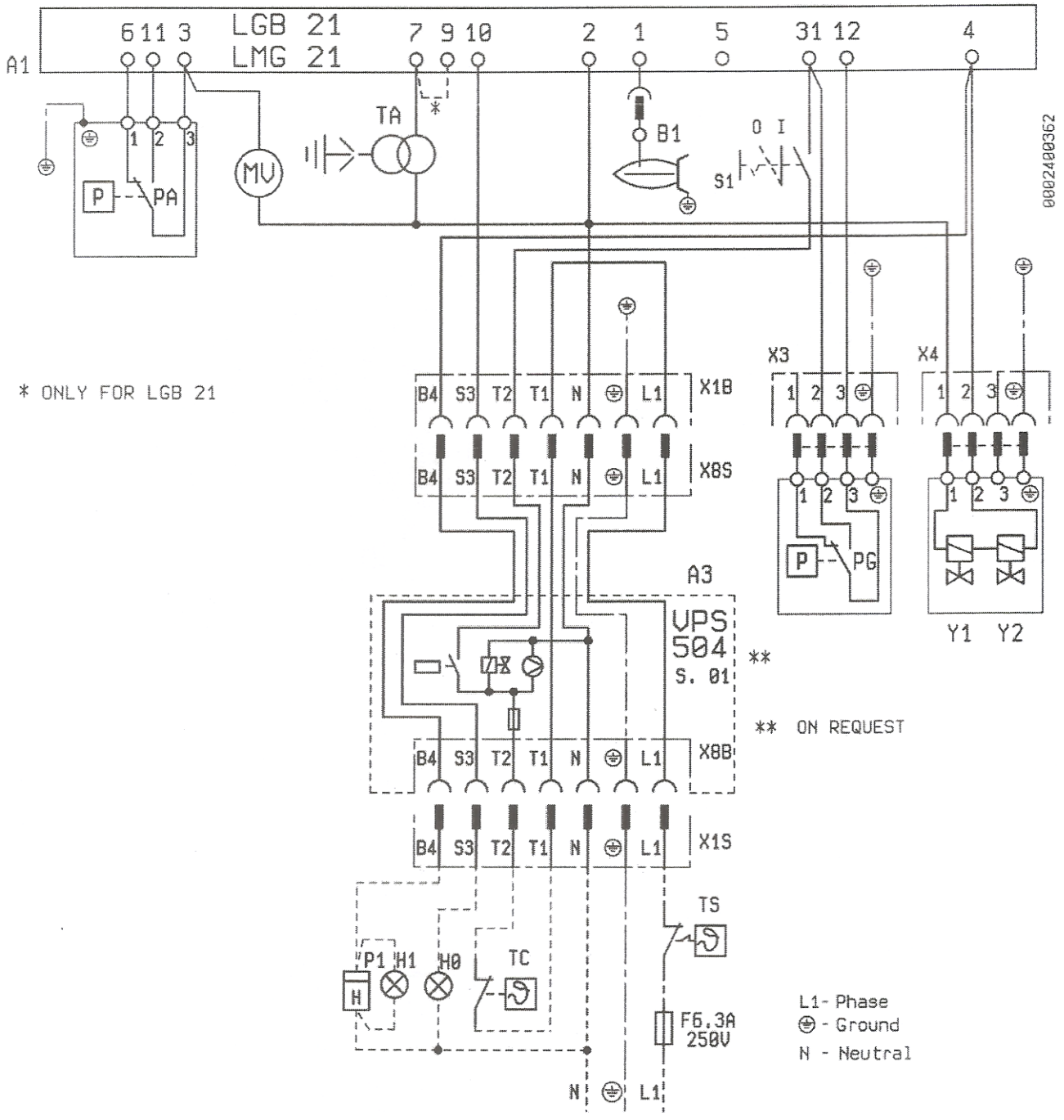




1) ELECTRIC DIAGRAM
2) ADJUSTING SCREW
3) 2nd FLAME AIR ADJUSTING CAM
4) 1st FLAME AIR ADJUSTING CAM
5) 2nd FLAME ACTUATING CAM.
   IT MUST BE ADJUSTED BETWEEN
   THE 1st FLAME AND THE
   2nd FLAME
6) ELECTRICAL CONNECTIONS
7) FIDUCIAL MARK



ELECTRIC DIAGRAM FOR BG10-35



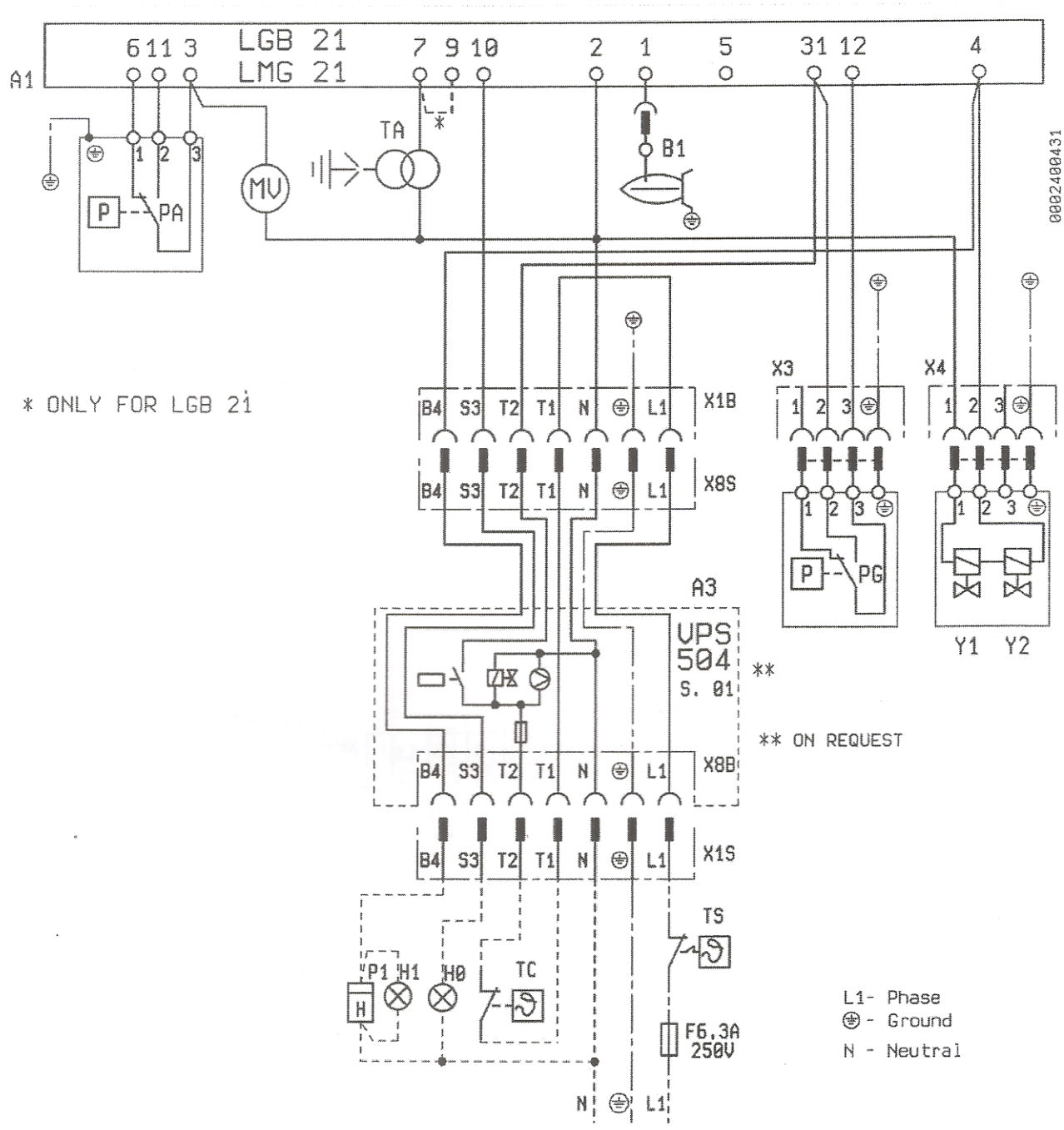
* ONLY FOR LGB 21

S1 -ON-OFF SWITCH
H0 -BLOCK LAMP
H1 -OPERATION LIGHT
PG -MIN. GAS PRESSURE SWITCH
B1 -IONISATION ELECTRODE
PA -AIR PRESSURE SWITCH
TA -IGNITION TRASFORMER
TS -SAFETY THERMOSTAT
TC -BOILER THERMOSTAT
A1 -CONTROL BÖX
Y1,Y2-GAS ELECTROVALVE
MV -FAN MOTOR
P1 -HOUR METER
A3 -VALVE TIGHTNESS CONTROL

1N~ 50Hz 230V
1N~ 60Hz 230V

MINIMUM IONISATION CURRENT 3 µA

ELECTRIC DIAGRAM FOR BG10T-35T

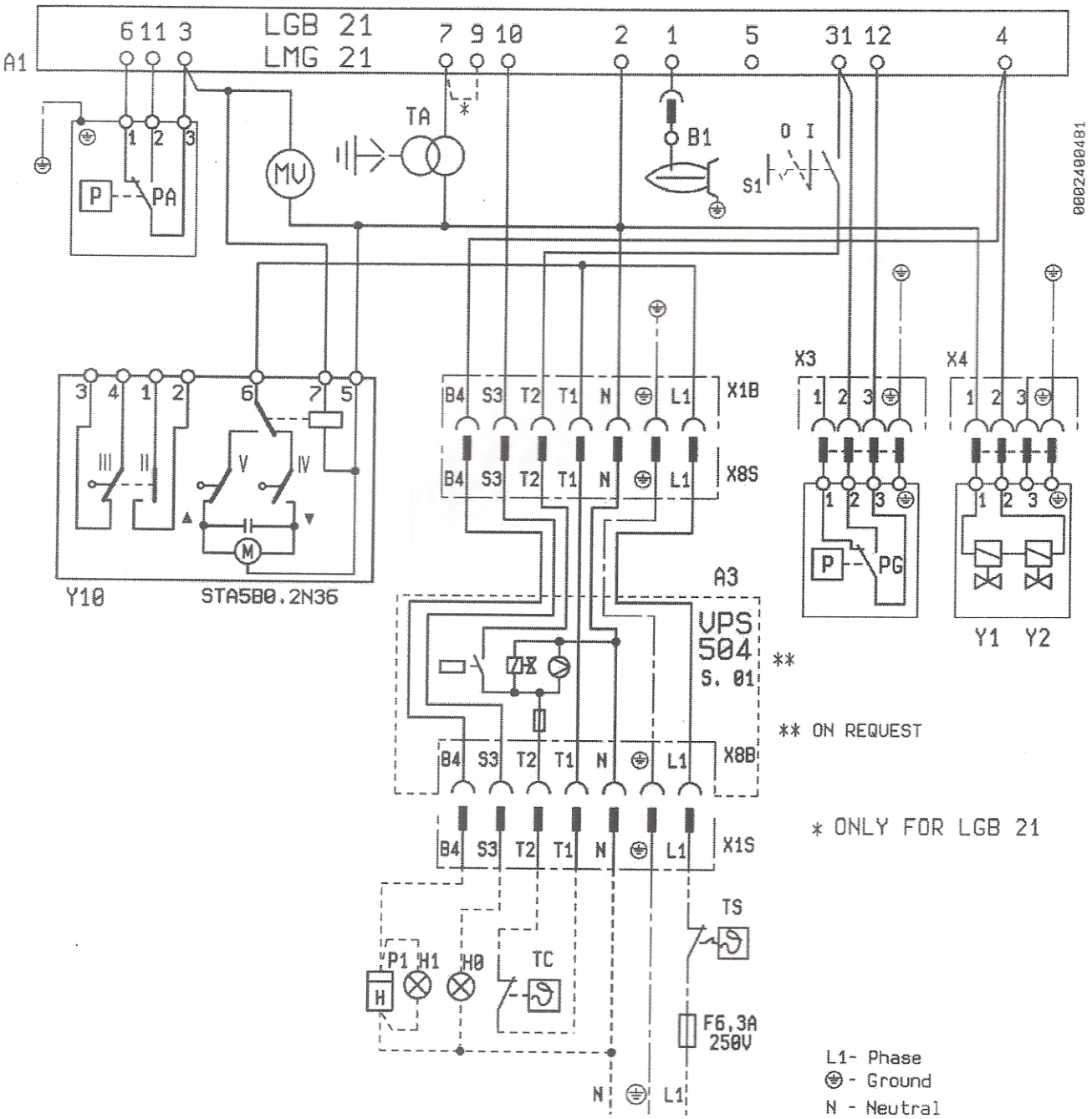


H0 -BLOCK LAMP
H1 -OPERATION LIGHT
PG -MIN. GAS PRESSURE SWITCH
B1 -IONISATION ELECTRODE
PA -AIR PRESSURE SWITCH
TA -IGNITION TRASFORMER
TS -SAFETY THERMOSTAT
TC -BOILER THERMOSTAT
A1 -CONTROL BÖX
Y1,Y2-GAS ELECTROVALVE
MV -FAN MOTOR
P1 -HOUR METER
A3 -VALVE TIGHTNESS CONTROL

1N~ 50Hz 230V
1N~ 60Hz 230V

MINIMALIONISATIONSSTROM 3 µA

ELECTRIC DIAGRAM FOR BG10-35 DACA

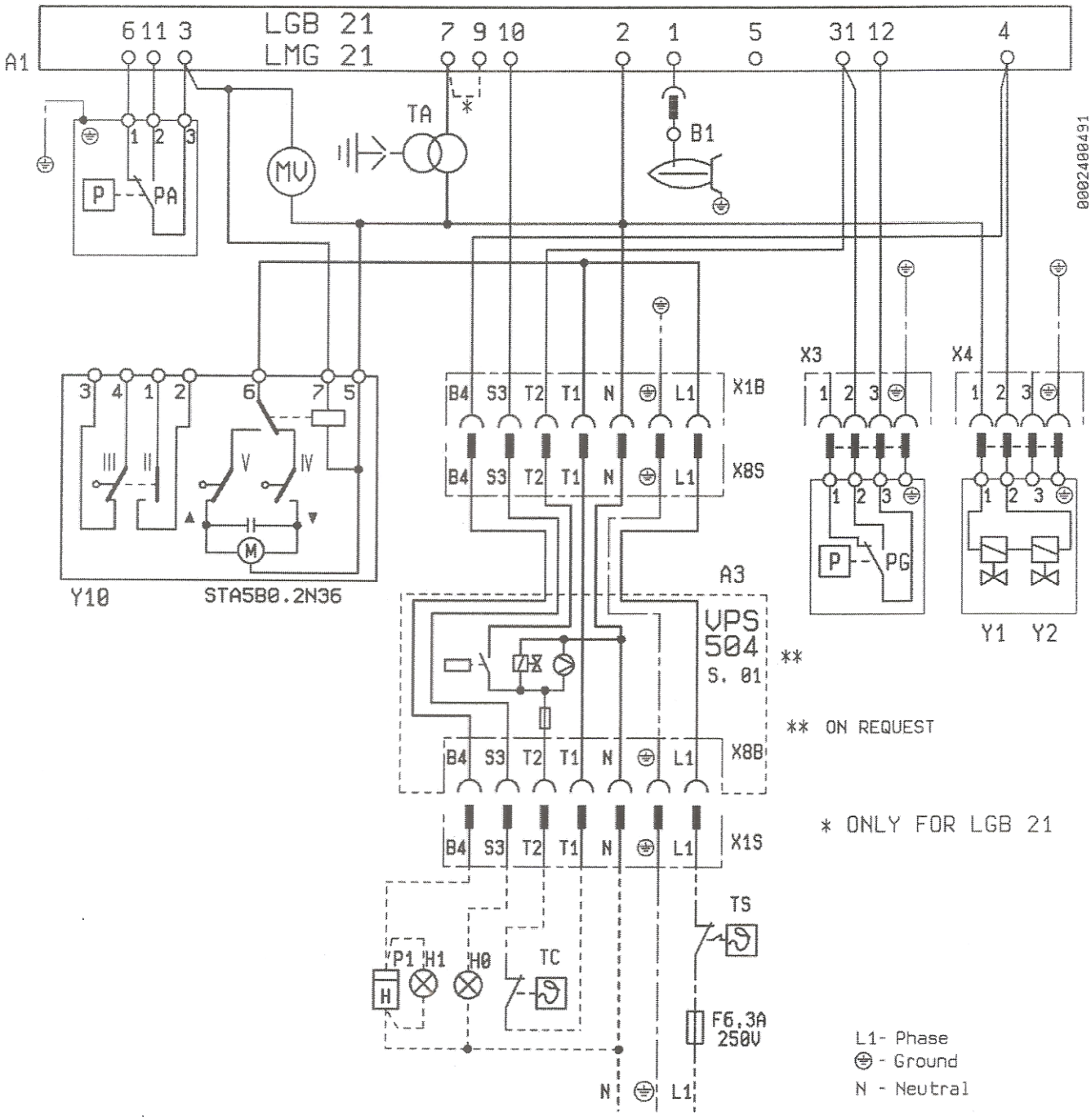


S1 -ON-OFF SWITCH
H0 -BLOCK LAMP
H1 -OPERATION LIGHT
PG -MIN. GAS PRESSURE SWITCH
B1 -IONISATION ELECTRODE
PA -AIR PRESSURE SWITCH
TA -IGNITION TRASFORMER
TS -SAFETY THERMOSTAT
TC -BOILER THERMOSTAT
A1 -CONTROL BÖX
Y1,Y2-GAS ELECTROVALVE
MV -FAN MOTOR
P1 -HOUR METER
A3 -VALVE TIGHTNESS CONTROL
Y10-AIR SERVOMOTOR

1N~ 50Hz 230V
1N~ 60Hz 230V

MINIMUM IONISATION CURRENT 3 µA

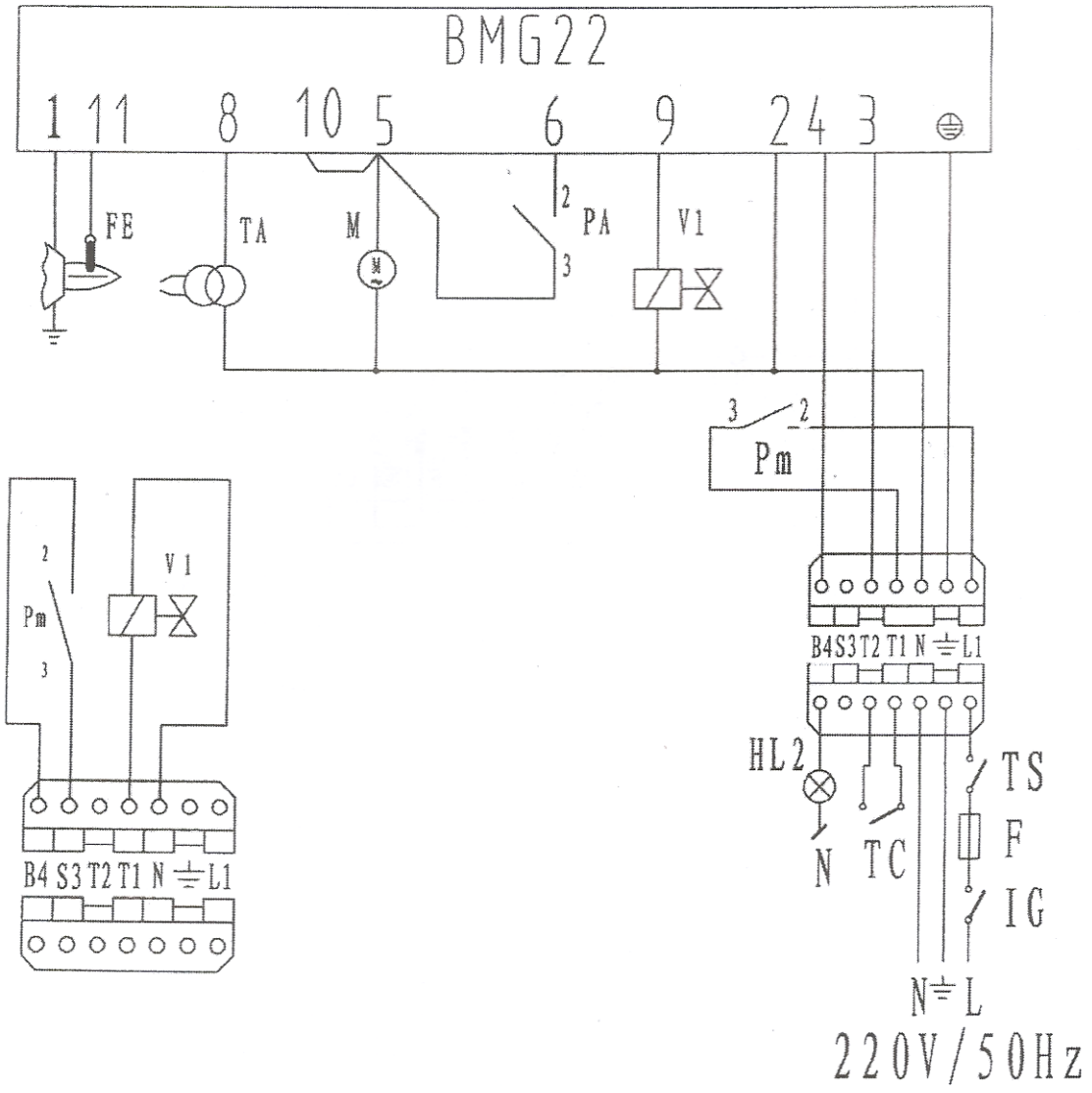
ELECTRIC DIAGRAM FOR BG10T-35T DACA



H0 -BLOCK LAMP
H1 -OPERATION LIGHT
PG -MIN. GAS PRESSURE SWITCH
B1 -IONISATION ELECTRODE
PA -AIR PRESSURE SWITCH
TA -IGNITION TRASFORMER
TS -SAFETY THERMOSTAT
TC -BOILER THERMOSTAT
A1 -CONTROL BÖX
Y1,Y2-GAS ELECTROVALVE
MV -FAN MOTOR
P1 -HOUR METER
A3 -VALVE TIGHTNESS CONTROL
Y10-AIR SERVOMOTOR

MINIMALIONISATIONSSTROM 3 µA

ELECTRIC DIAGRAM FOR BG10-35 DACA



SOLENOIDE VALVE AND GAS PRESSURE SWITCH DIAGRAM

PA-AIR PRESSURE SWITCH
Pm-GAS PRESSURE SWITCH
V1-SOLENOIDE VALVE
FE-IONIC PROBE
M-MOTOR
TA-IGNITION TRANSFORMER
IG-EXT POWER SWITCH
F-FUSE(6.3A)
HL2-ALARM
TS-SAFETY THERMOSTAT
TC-THERMOSTAT