

Installation- and maintenance instruction
BG550,BG550LN,BG650

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DESCRIPTION

Warning



- Read the manual before assembling or commissioning.
- The contents of this manual are to be observed by all who work for any reason on the unit and its appertaining system parts.
- This manual is intended especially for authorised personnel.
- This manual is to be regarded as part of the burner and shall always be available near the place of installation.
- The burner is only to be installed by qualified personnel
- Check that the burner is suitable for the boiler's power range.
- The burner is to be installed such that it complies with any local regulations relating to electrical safety, boilers and fuel distribution.
- Check that the burner is approved for the gas quality intended used.
- No burner safety systems are to be disengaged.
- The fitter is to ensure that the boiler room is supplied with fresh air ventilation that is sufficient in accordance with local standards.
- Before servicing, shut off the fuel supply and the power supply to the burner.
- The outer temperature of the boiler's components can exceed 60 °C.
- Check that the guide stop is installed before servicing.
- Take great care when servicing. Trap and pinch risks can be present.
- The boiler's sound level can exceed 85 dBA during operation. Use ear protectors when present in the boiler room.

Safety directions

- The electrical installation shall be made according to valid regulations for heavy current and in a professional way, so that the risk of leaking gas, fire or personal injury is avoided.
- If another electrical connection is used than the one recommended by Enertech, there might be a risk of material damage or personal injury.
- Notice should be carefully taken by the installer that no electrical cables or gas pipes get squeezed or damaged when installing or at service
- If the boiler is provided with an opening door, this should be interlocked with a door switch.

Acceptance inspection

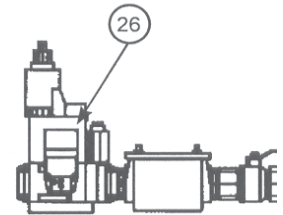
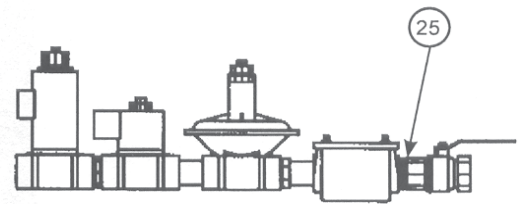
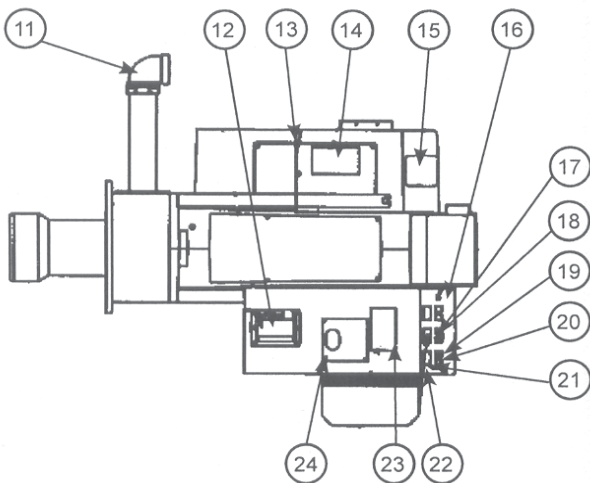
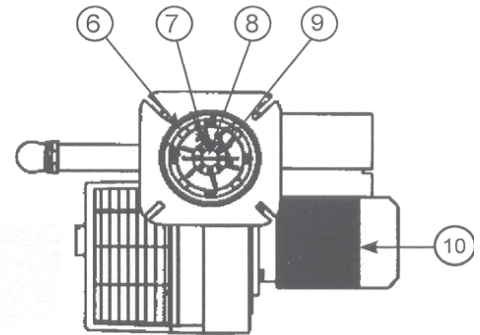
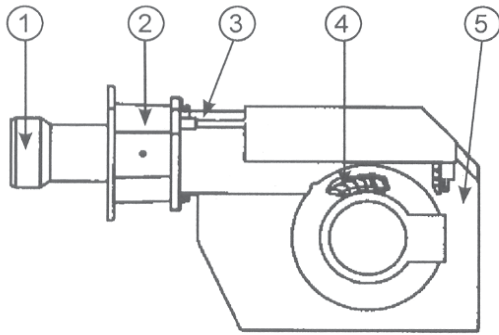
- Ensure that everything is delivered and that there is no transport damage.
- If there is anything wrong with the delivery, please report it to the supplier.
- Any transport damage should be reported to the forwarding company.

Preparations for installation

- Ensure that the size and capacity range of the burner are suitable for the boiler.
- Power data on the data plate refer to the minimum and maximum power of the burner.

DESCRIPTION

2-Stage

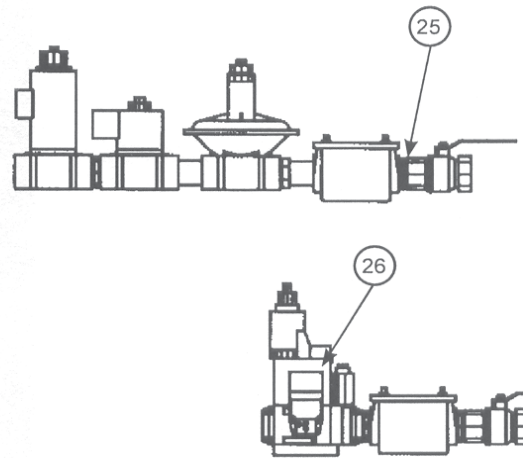
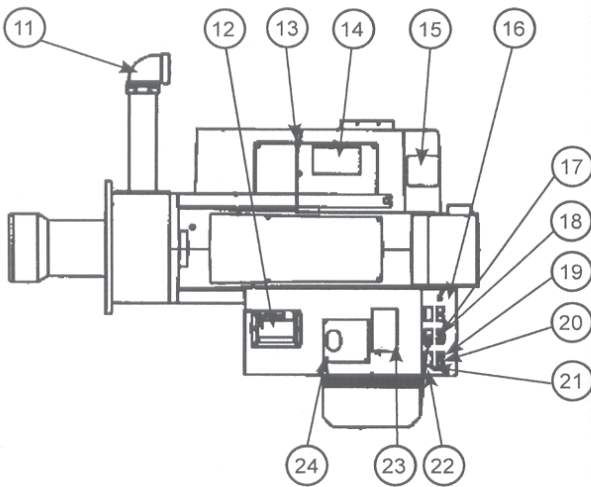
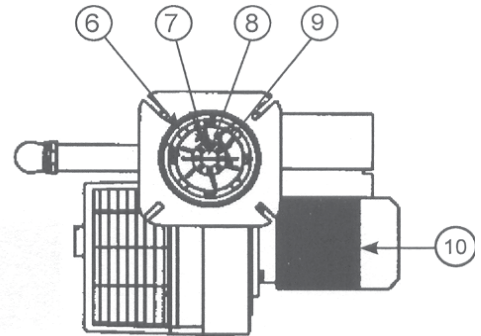
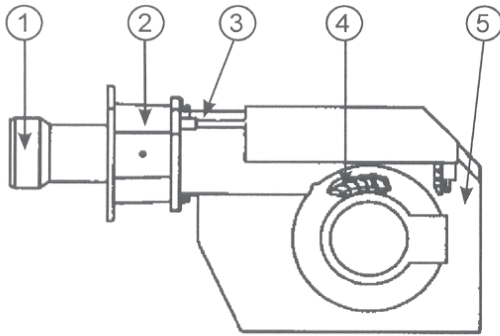


Components

- | | |
|-----------------------------|--|
| 1. Flame cone | 15. Air pressure switch |
| 2. Connection flange | 16. Fuse holder |
| 3. Guide bar | 17. Indicating lamp Stage 2 |
| 4. Fan wheel | 18. Switch I-II |
| 5. Fan house | 19. Indicating lamp Stage I |
| 6. Shrouded disc | 20. Switch 0-I |
| 7. Ignition electrode | 21. Time meter, stage 1 |
| 8. Nozzle | 22. Time meter, stage 2 |
| 9. Ionisation electrode | 23. Contactor with thermal overload protection |
| 10. Motor | 24. Control box |
| 11. Connection gas fittings | 25. Gas train |
| 12. Ignition transformer | 26. MultiBloc |
| 13. Air damper | |
| 14. Air damper motor | |

DESCRIPTION

Modulating



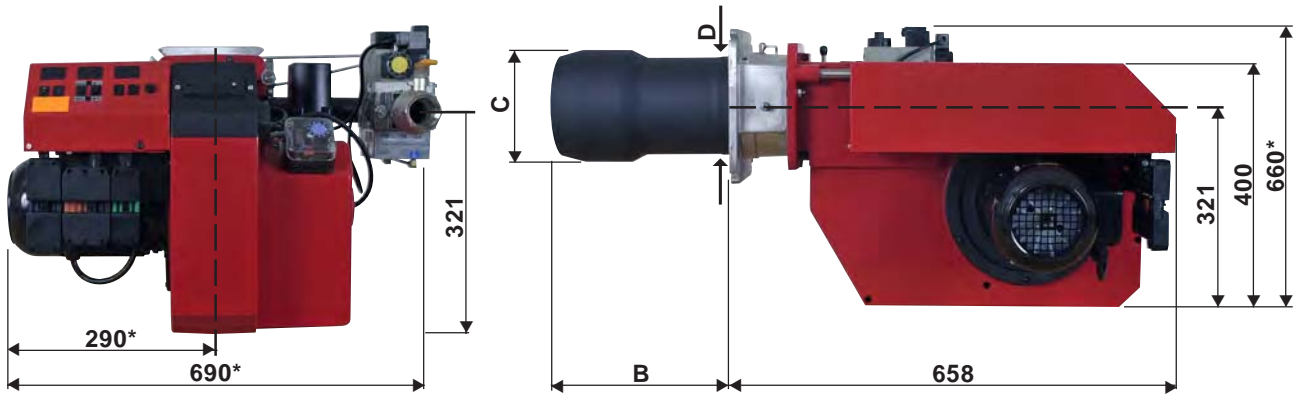
Components

- | | |
|-----------------------------|---|
| 1. Flame cone | 15. Air pressure switch |
| 2. Connection flange | 16. Fuse holder |
| 3. Guide bar | 17. Change-over switch
increase-decrease |
| 4. Fan wheel | 18. Change-over switch
manually-automatically |
| 5. Fan house | 19. Indicating lamp |
| 6. Shrouded disc | 20. Switch 0-I |
| 7. Ignition electrode | 21. Time meter |
| 8. Nozzle | 23. Contactor with thermal
overload protection |
| 9. Ionisation electrode | 24. Control box |
| 10. Motor | 25. Gas train |
| 11. Connection gas fittings | 26. MultiBloc |
| 12. Ignition transformer | |
| 13. Air damper | |
| 14. Air damper motor | |

TECHNICAL DATA

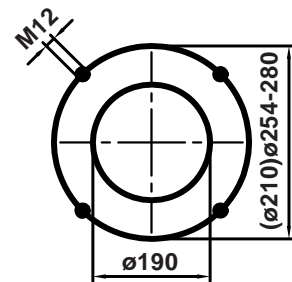
Type designation BG550/BG550LN/BG650

Dimensions



	Length of burner tube BG550	Flange Measure B BG550	Burner tube Measure C BG550	Burner tube Measure D BG550	Length of burner tube BG550LN	Flange Measure B BG550LN	Burner tube Measure C BG550LN	Burner tube Measure D BG550LN
Standard 1	256	226	162	162	252	222	162	162
Standard 2	356	326	162	162	352	322	162	162
Standard 3	456	426	162	162	452	422	162	162

	Length of burner tube BG650	Flange Measure B BG650	Burner tube Measure C BG650	Burner tube Measure D BG650
Standard 1	316	286	185	162
Standard 2	416	386	185	162
Standard 3	516	486	185	162



* The above dimensions are max. measurements. Depending on the components used, the measurements may vary.

TECHNICAL DATA

Output range

Capacity kW	Gas volume at a min. output Nm ³ /h ¹⁾	Gas volume at a max output Nm ³ /h ¹⁾	Max. inlet pressure mbar	Rated inlet pressures mbar
BG550 G20 140-640 G25 140-600 G30 140-620 G31 140-620	14,8 17,4 4,3 5,7	67,7 74,4 19,2 25,4	360 360 360 360	40 40 30-50 30-50
BG550LN G20 140-620 G25 140-620	14,8 17,4	35,6 76,9	360 360	40 40
BG650 G20 200-1125 G25 200-1125 G30 200-1125 G31 200-1125	21,2 24,8 6,2 8,2	119,0 139,6 34,9 46,0	360 360 360 360	40 40 30-50 30-50

Type	kWh/m ³ ¹⁾	kWh/kg
G20: Natural gas H	9,45	
G25: Natural gas L	8,06	
G30: Butane	32,24	12,68
G31: LPG	24,44	12,87

¹⁾ Calorific value: kWh/m³ 15°C 1013.25 mbar (according to EN676)

²⁾ Dimension and capacity depending on gas quality and available pressure

Connection ²⁾	Motor	Ignition transformer
BG550/BG550LN Natural gas LPG 1 1/2"-2"	0,75 kW 230/400V 50 Hz 3,1/1,8A	Primary 230 V, 0,25A 50-60Hz 60VA Sec. 11kV Ampl 50 mA rms 33% ED in 3 min
BG650 Natural gas LPG 1 1/2"-2"	1,5 kW 230/400V 50 Hz 5,7/3,3A	Primary 230 V, 0,25A 50-60Hz 60VA Sec. 11kV Ampl 50 mA rms 33% ED in 3 min

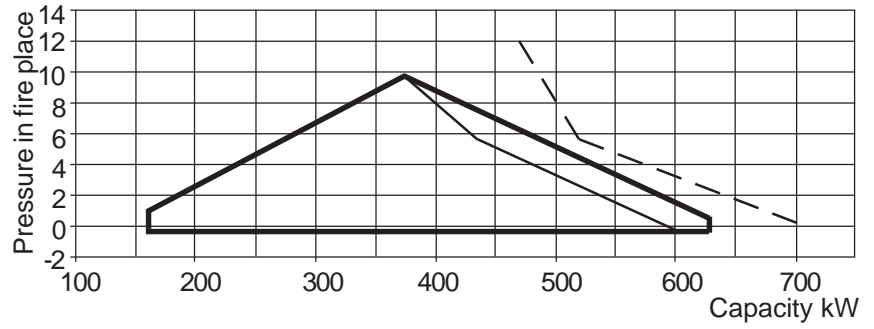
TECHNICAL DATA

Working field

BG550

140-640 kW

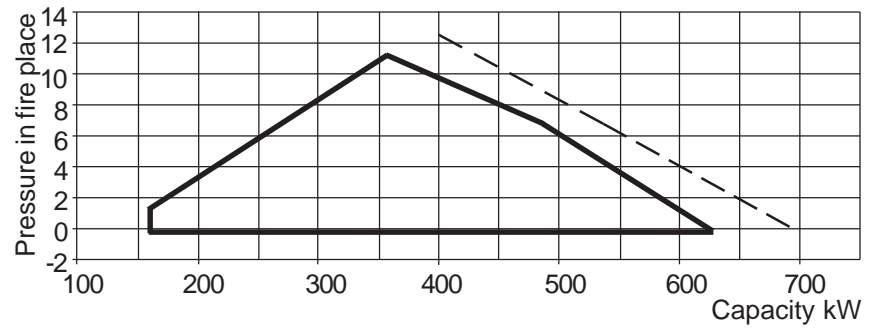
- BG550
- BG550 (G25)
- - - - - Measured (test)



BG550LN

140-620 kW

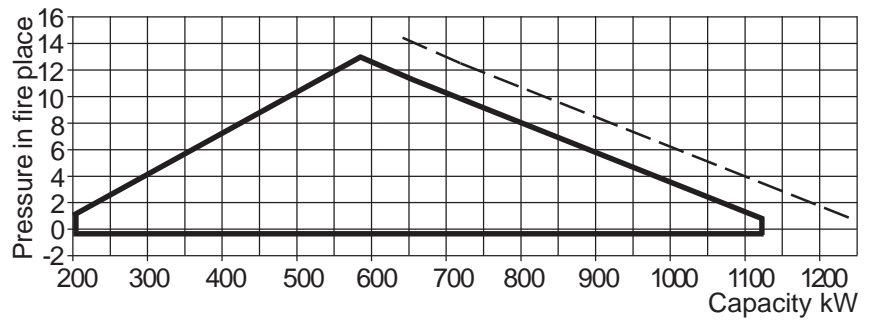
- BG550LN
- - - - - Measured (test)



BG650

200-1125 kW

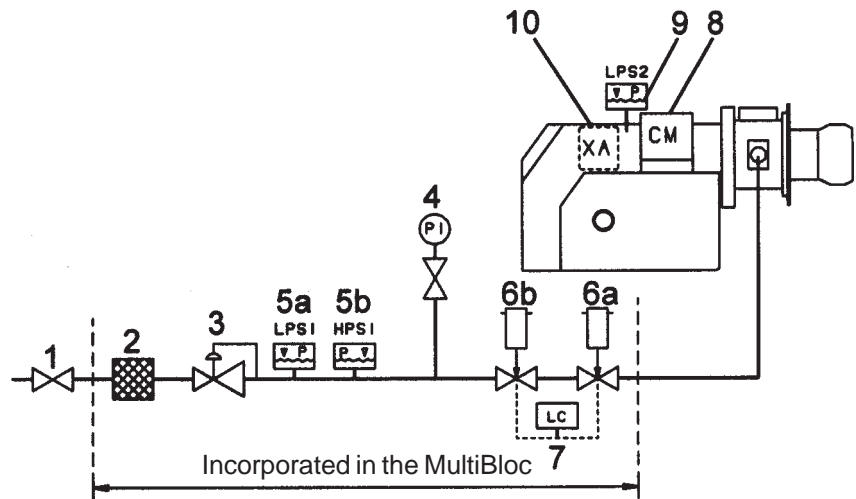
- BG650
- - - - - Measured (test)



Unbroken line is the approved working field as per EN 676.

SKELETON DIAGRAMS

2-stage or modulating burners



1. Ball valve
2. Filter
3. Governor
4. Pressure gauge with shut-off cock
- 5a. Gas pressure switch, mini
- 5b. Gas pressure switch, maxi
- 6a. Main valve, 2-stage
- 6b. Safety valve
- ¹⁾ 7. Valve proving system
8. Air damper motor
9. Air pressure switch
10. Gas burner control

Pos. 5b, 7: Components not required according to EN 676.

¹⁾Required over 1200 kW according to EN 676.



When Bio gas is used, Bentone shall always be contacted.

MOUNTING OF THE BURNER

Fit the burner to the boiler by means of 4 bolts M12. For flange and bolt dimensions see technical data.

If for some reason you want to separate the burner from the gas flange with burner head and valve package you can do so.

Do like this:

- Remove the cover of the fan housing.
- Loosen the nut D of the gas assembly package.
- Loosen the electric cables to the valve package.
- Loosen the screws B on both sides.
- Loosen the stop bolt C on the pull rods.
- Loosen the ignition cable and the ionisation cable from the gas assembly.
- Pull out the burner on the pull rods and put it in a suitable place.

When the burner head and the gas flange have been fitted to the boiler it is easy to lift up the burner to where it belongs.

Inspection of gas assembly

If the gas assembly needs to be inspected the pull rods are very useful.

Do like this:

- Remove the cover of the fan housing.
- Loosen the nut D of the gas assembly package.
- Loosen ignition cable and ionisation cable of gas assembly.
- Loosen the screw A on both sides.
- Pull out the burner on the pull rods.
- Loosen the screws B on the gas flange.
- Withdraw the gas assembly.

Ensure that the O-ring between the gas assembly and the gas flange will be in the correct position when the gas assembly is fitted again.

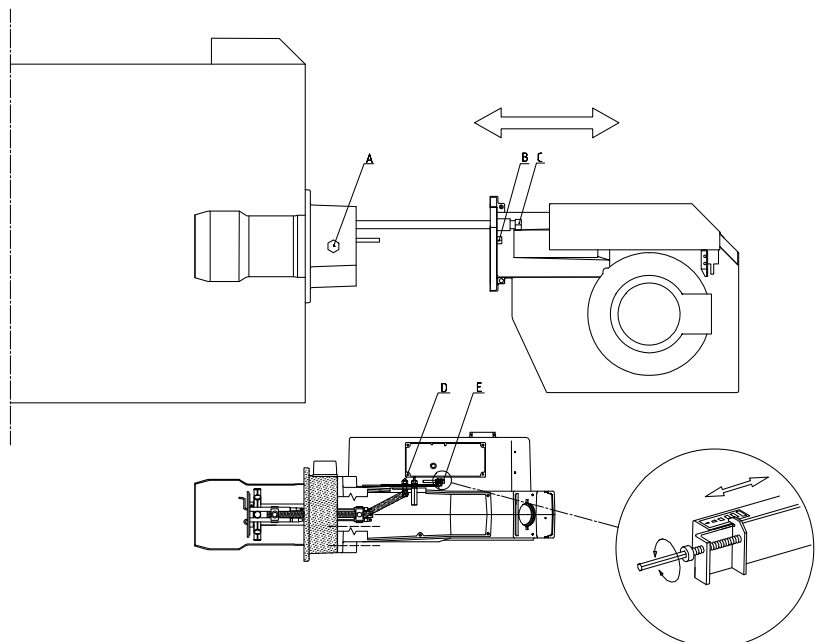
Adjustment of the position of the shrouded disc in the blast tube

Sometimes it is necessary to adjust the position of the shrouded disc in the blast tube. This can be done with the screw E (can be adjusted when the burner is in operation). If you turn the screw to the left the shrouded disc will move forward (+), to the right it will move backward.

NOTE!

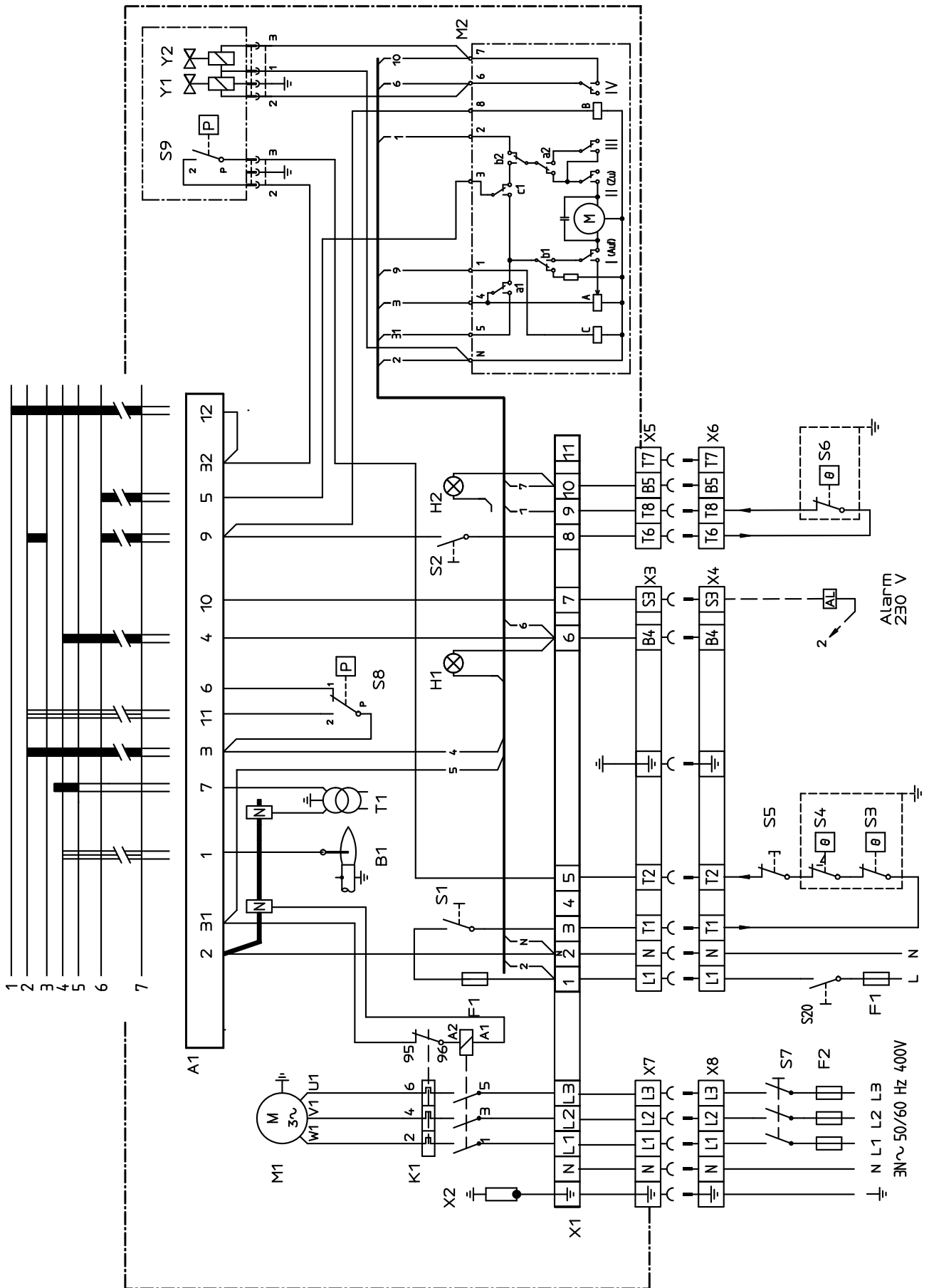
For maintenance of the brake plate, nozzles, electrodes etc, when using a long design of the burner tube, you have to **remove the nozzle assembly from the connecting pipe and move the assembly backwards** in the fan housing (from the boiler).

Service position



ELECTRIC EQUIPMENT

Wiring diagram LGB22/LMG22/LME22 (BG550/BG650) 2-Stage



ELECTRIC EQUIPMENT

List of components LGB22/LMG22/LME22 (BG550/BG650) 2-Stage

A1	Gas burner control	S7	Main switch 3-phase
B1	Ionization electrode	S8	Air pressure switch
F1	Operation fuse	S20	Main switch 1-phase
F2	Operation fuse	T1	Ignition transformer
H1	Lamp, low capacity	X1	Connection terminal board
H2	Lamp, high capacity (optional)	X2	Earth terminal
K1	Motor contactor with thermal overload protector	X3	Plug-in contact, burner
M1	Burner motor	X4	Plug-in contact, boiler
M2	Damper motor, L&S SQN75.624.A21B	X5	Plug-in contact, stage 2, burner
S1	Operating switch	X6	Plug-in contact, stage 2, boiler
S2	Operating switch, stage 2	X7	Plug-in contact, 3-phase, burner
S3	Control thermostat	X8	Plug-in contact, 3-phase, boiler
S4	Temperature limiter	S9	Gas pressure switch
S5	Micro switch for hinged door	Y1	Gas solenoid valve 1
S6	Control thermostat, stage 2	Y2	Gas solenoid valve 2

If S6 is missing, connection between T6 and T8.
Mains connection and fuse in accordance with local regulations.

Function LGB22/LMG22/LME22

1. Operating switch ON-Thermostat ON-Gas pressure switch ON-Air damper closed.

A control is made that the air pressure switch does **not** indicate fan pressure. Then the burner motor starts.

2. Air damper motor opens.

The air damper motor opens the damper to full load. A control is made that the air pressure switch indicates sufficient fan pressure.

3. Air damper motor closes.

The air damper motor closes to low load. Then the ignition spark is formed.

4. Main and safety valves open

The gas is ignited. The ionization electrode indicates a flame.

5. The safety time expires.

The ignition spark goes out. The safety time expires. If there is no flame or if for some reason the flame disappears after this time limit, the burner control locks out.

6. Operating position.

The burner is in operating position and can now change over to full load if the operating switch and the thermostat for full load are in position ON. The burner can alternate between full and low load depending on set temperature.

7. Stop.

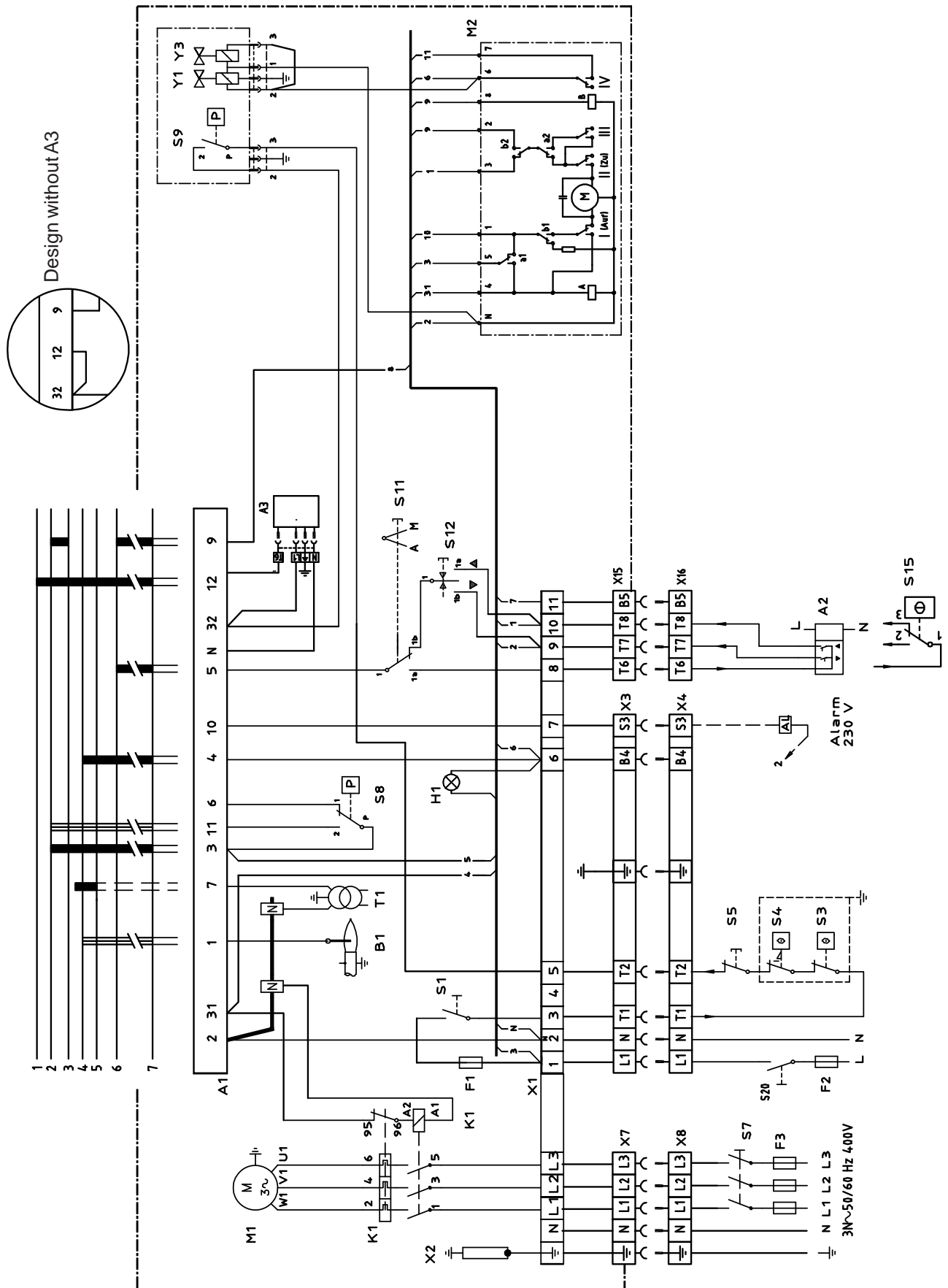
The operation of the burner can now be interrupted by means of the operating switch or the thermostat.

The control locks out.

The red lamp in the control is lit. Restart the burner by pressing the reset button.

ELECTRIC EQUIPMENT

Wiring diagram LMG22/LME22 (BG550/BG550LN/BG650) Modulating



ELECTRIC EQUIPMENT

List of components LMG22/LME22 (BG550/BG550LN/BG650) Modulating

A1	Gas burner control	S12	Change-over switch, Increase-Reduce
A2	Power control	S15	Control thermostat, 3-pole (only for 2-stage sliding)
A3	Valve, leak tester, Dungs VPS 504	S20	Main switch 1-phase
B1	Ionization electrode	T1	Ignition transformer
F1	Operation fuse	X1	Connection terminal board
F2	Operation fuse	X2	Earth terminal
F3	Operation fuse	X3	Plug-in contact, burner
H1	Operating lamp	X4	Plug-in contact, boiler
K1	Motor contactor with thermal overload protector	X7	Plug-in contact, 3-phase, burner
M1	Burner motor	X8	Plug-in contact, 3-phase, boiler
M2	Damper motor, L&S SQN75.624.A21B	X15	Plug-in contact, power controller, burner
S1	Operating switch	X16	Plug-in contact, power controller
S3	Control thermostat	S9	Gas pressure switch
S4	Temperature limiter	Y1	Gas solenoid valve 1
S5	Micro switch for hinged door	Y3	Safety solenoid valve
S7	Main switch 3-phase		
S8	Air pressure switch		
S11	Change-over switch, Aut.-man.		

Mains connection and fuse in accordance with local regulations.

Function LMG22/LME22

1. Operating switch ON-Thermostat ON-Gas pressure switch ON-Air damper closed.

A control is made that the air pressure switch does **not** indicate fan pressure. Then the burner motor starts.

2. Air damper motor opens.

The air damper motor opens the damper to max. position. A control is made that the air pressure switch indicates sufficient fan pressure.

3. Air damper motor closes.

The air damper motor closes to min. load position. Then the ignition spark is formed.

4. Main and safety valves open

The gas is ignited. The ionization electrode indicates a flame.

5. The safety time expires.

The ignition spark goes out. The safety time expires. If there is no flame or if for some reason the flame disappears after this time limit, the burner control locks out.

6. Operating position.

The burner is in operating position and can now change over to the capacity controlled by the regulator.

7. Stop.

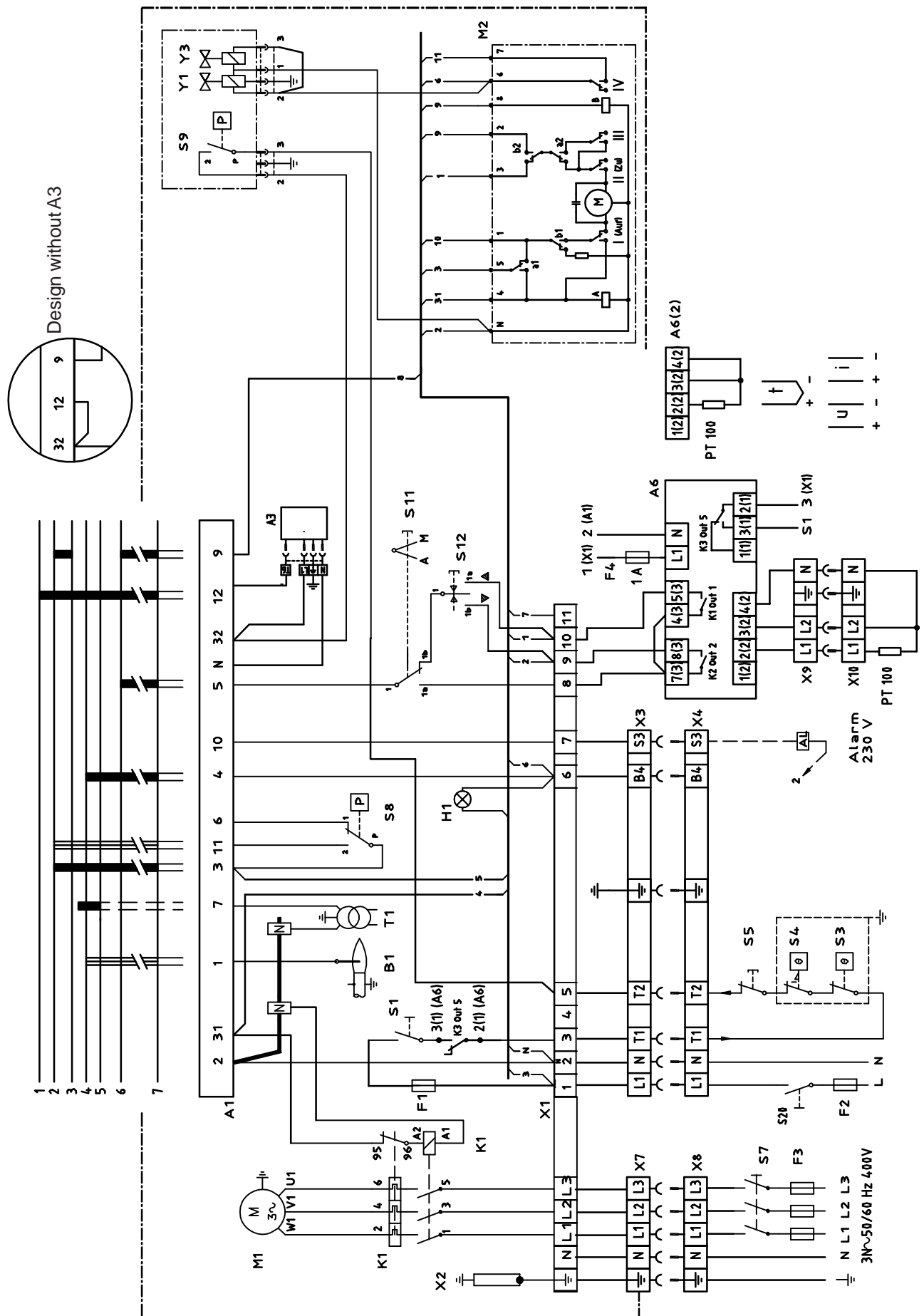
The operation of the burner can now be interrupted by means of the operating switch or the thermostat.

The control locks out.

The red lamp in the control is lit. Restart the burner by pressing the reset button.

ELECTRIC EQUIPMENT

Wiring diagram LMG22 (BG550/BG550LN/BG650) Modulating with R316



ELECTRIC EQUIPMENT

List of components LMG22 (BG550/BG550LN/BG650) Modulating with R316

A1	Gas burner control	S8	Air pressure switch
A3	Valve, leak tester, Dungs VPS 504	S11	Change-over switch, Aut.-man.
A6	Power control R316	S12	Change-over switch, Increase-Reduce
A6(2)	PT 100-sensor, Thermocouple, current/voltage	S20	Main switch 1-phase
B1	Ionization electrode	T1	Ignition transformer
F1	Operation fuse	X1	Connection terminal board
F2	Operation fuse	X2	Earth terminal
F3	Operation fuse	X3	Plug-in contact, burner
F4	Operating fuse 1A	X4	Plug-in contact, boiler
H1	Operating lamp	X7	Plug-in contact, 3-phase, burner
K1	Motor contactor with thermal overload protector	X8	Plug-in contact, 3-phase, boiler
M1	Burner motor	X9	Plug-in contact, power controller R316, burner
M2	Damper motor, L&S SQN75.624.A21B	X10	Plug-in contact, power controller R316
S1	Operating switch	S9	Gas pressure switch
S3	Control thermostat	Y1	Gas solenoid valve 1
S4	Temperature limiter	Y3	Safety solenoid valve
S5	Micro switch for hinged door		
S7	Main switch 3-phase		

Mains connection and fuse in accordance with local regulations.

Function LMG22

1. Operating switch ON-Thermostat ON-Gas pressure switch ON-Air damper closed.

A control is made that the air pressure switch does **not** indicate fan pressure. Then the burner motor starts.

2. Air damper motor opens.

The air damper motor opens the damper to max. position. A control is made that the air pressure switch indicates sufficient fan pressure.

3. Air damper motor closes.

The air damper motor closes to min. load position. Then the ignition spark is formed.

4. Main and safety valves open

The gas is ignited. The ionization electrode indicates a flame.

5. The safety time expires.

The ignition spark goes out. The safety time expires. If there is no flame or if for some reason the flame disappears after this time limit, the burner control locks out.

6. Operating position.

The burner is in operating position and can now change over to the capacity controlled by the regulator.

7. Stop.

The operation of the burner can now be interrupted by means of the operating switch or the thermostat.

The control locks out.

The red lamp in the control is lit. Restart the burner by pressing the reset button.

ELECTRIC EQUIPMENT

Control diagnosis under fault conditions and lockout indication Gas burner control: LGB ...

Lock-out and Control Programme Indication

The position of the cam can be read through the sight-glass. Under fault condition the programme is stopped and thus also the lock-out indicator. The symbol visible on the cam indicates both the position in the programme run and the type of fault. The symbols are explained below:

- ◀ No start because the control loop is interrupted
- ||| Waiting for the pre-purge to start
- ▲ Air damper open (LGB22)
- P Fault condition due to absence of air pressure signal (LGB21),
air damper not open (LGB22)
- ◀◀◀ Pre-purge period
- ▼ Fuel release (LGB22)
- 1 Fault condition because no flame signal available after elapse of the 1st safety
time
- 2 Release of the 2nd fuel valve (LGB21)
Release of the load controller LR (LGB22)
- Partial or full load operation (or return to the operating position)

Control Programme in Case of Faults

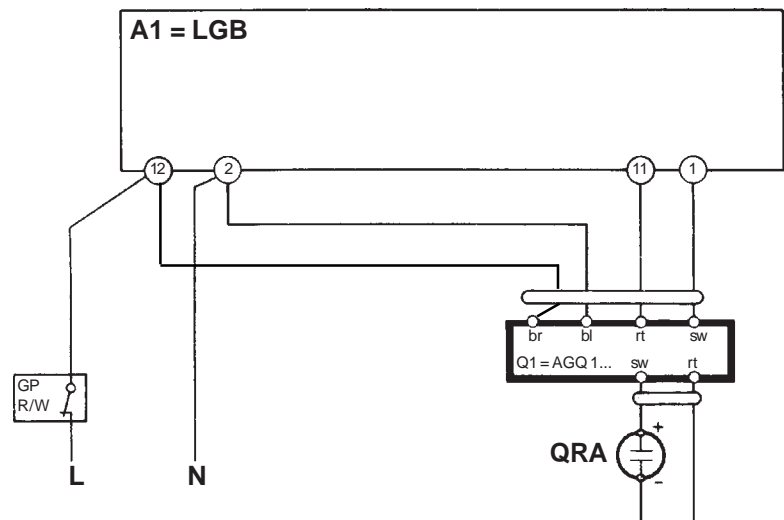
Basically, the fuel supply is stopped immediately in the case of any fault. If the fault condition occurs at a time between start and pre-ignition, which is not indicated by symbols, the cause is usually a switch-off by the air pressure switch LP or a too early, i.e. faulty, flame signal.

- **After supply voltage failure:** Start-up repetition with unabridged programme.
- **If premature flame signal** at start of pre-purge time: Immediate lock-out.
- **If contacts of air pressure switch LP have welded during tw:** No start.
- **If no air pressure signal:** Lock-out when t10 has elapsed.
- **If air pressure failure** after elapse of t10: Immediate lock-out.
- **If burner does not ignite:** Lock-out when safety time t2 has elapsed.
- **If flame is lost during operation:** Immediate lock-out.
- **For ignition spark proving with QRE:** If no ignition spark signal, the valves remain closed and there is lock-out when t2 has elapsed.

Resetting the burner controls

The controls can be reset immediately after any fault condition. The programme reverts to its start position and programmes the controls for restarting the burners.

Connecting signal amplifier

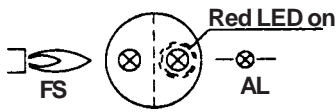


ELECTRIC EQUIPMENT

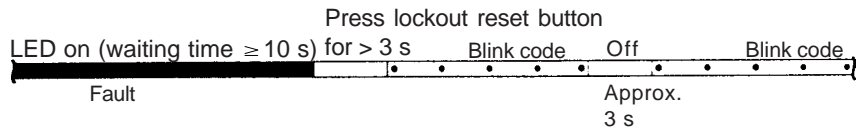
Control diagnosis under fault conditions and lockout indication

Gas burner control: LMG ...

Diagnosis of cause of fault



After lockout, the red fault LED is steady on. For reading the cause of fault, refer to the blink code given in the following table:



Error code table

Blink code	Possible cause
2 x ••	<ul style="list-style-type: none"> No establishment of flame at the end of «TSA» - Faulty or soiled detector electrode - Faulty or soiled fuel valves - Poor adjustment of burner
3 x •••	<ul style="list-style-type: none"> Air pressure monitor does not close - «LP» faulty - «LP» incorrectly adjusted - Fan motor does not run
4 x ••••	<ul style="list-style-type: none"> Air pressure monitor does not open or extraneous light on burner startup - «LP» faulty - «LP» incorrectly adjusted
5 x •••••	<ul style="list-style-type: none"> Extraneous light during pre-purging - Or internal device fault
7 x •••••••	<ul style="list-style-type: none"> Loss of flame during operation - Poor adjustment of burner - Faulty or soiled fuel valves - Short-circuit between detector electrode and ground
8...17 x •••••••• •••••••• ••••••••	• Free
18 x •••••••• ••••••••	<ul style="list-style-type: none"> Air pressure monitor opens during pre-purging or operation - «LP» incorrectly adjusted - Four times loss of flame during operation (LMG25)
19 x •••••••• ••••••••	<ul style="list-style-type: none"> Faulty output contact - Wiring error - External power supply on output terminal
20 x •••••••• ••••••••	• Internal device fault

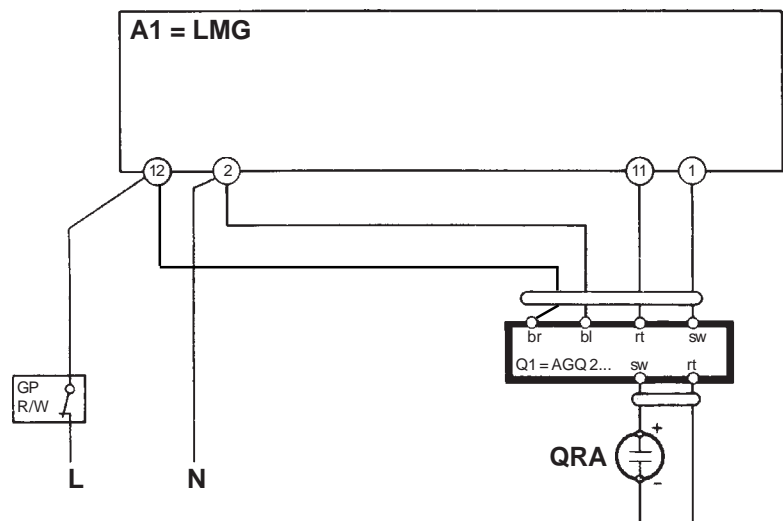
During the time the cause of the fault is diagnosed, the control outputs are deactivated.

- The burner remains shut down
- Exception: fault status signal «AL» at terminal 10

The burner is switched on only after a reset is made.

- Press lockout reset button for 0.5...3 seconds

Connecting signal amplifier



ELECTRICAL EQUIPMENT

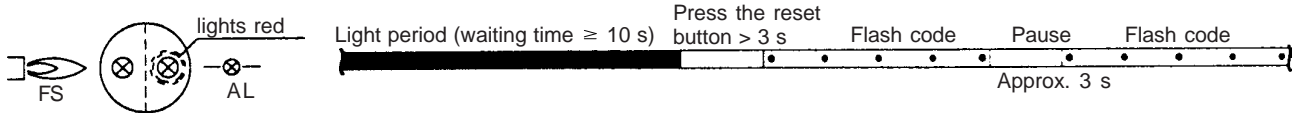
Control program when disruption; disruption display Gas burner control: LME....

Colour codes

Colour code table for multi-coloured signal lamps (Light diodes)		
Status	Colour codes	Colours
Waiting time «tw», other waiting times	○.....	Off
Ignition phase, ignition checked	●○ ●○ ●○ ●○ ●○ ●	Flashing yellow
Normal operation	□.....	Green
Operation, poor flame signal	□○□○□○□○□○□○	Flashing green
Prohibited flame signal during start up	□▲□▲□▲□▲□▲□▲	Green-Red
Undervoltage	●▲●▲●▲●▲●▲●▲	Yellow-Red
Disruption, alarm	▲.....	Red
Flashing code for fault codes	▲○ ▲○ ▲○ ▲○	Flashing red
Interface diagnostics	▲▲▲▲▲▲▲▲	Red flickering

- Continuous
- Off
- ▲ Red
- Yellow
- Green

Diagnostics alarm trigger The red alarm signal lamp lights continuously after the alarm is disconnected. Diagnostics for alarm triggers can be read as specified by the following sequence:



Limit on start attempts

LME 11 ... limits the number of start attempts if the flame does not ignite on start-up or goes out during operation. LME 11 ... permits a maximum of three start attempts if the start cycle is uninterrupted.

ELECTRICAL EQUIPMENT

Control program when disruption; disruption display Gas burner control: LME....

Alarm control table

Red flashing code on signal lamp (LED)	Possible causes
Flashing 2 x ••	No flame at End of «TSA» - Defective or obscured flame monitor - Defective or obscured fuel valves - Poor burner installation - Defective ignition unit
Flashing 3 x •••	«LP» defective - No air monitor signal after «t10» - «LP» is welded in the open position
Flashing 4 x ••••	Prohibited flame signal during start up
Flashing 5 x •••••	Time out «LP» - «LP» is welded in the closed position
Flashing 6 x ••••••	Free
Flashing 7 x •••••••	Too many loss of flame during operation - Poor burner installation - Defective or obscured fuel valves - Defective or obscured flame monitor
Flashing 8 x ••••••••	Free
Flashing 9 x •••••••••	Free
Flashing 10 x ••••••••••	Connection fault or internal fault, outgoing contacts or other fault
Flashing 14 x •••••••••• ••••	CPI contact not closed

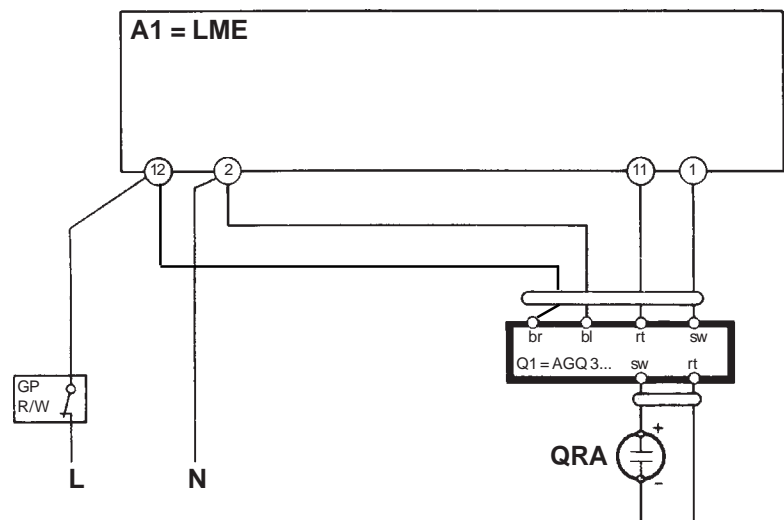
During alarm trigger diagnostics, control outputs are to be disconnected from all power.

- The burner is disconnected
- Exception, the «AL» alarm signal at connection block 10
The burner is only to be reconnected after it is reset
- Press the reset button 0.5...3 s.

Interface diagnostics

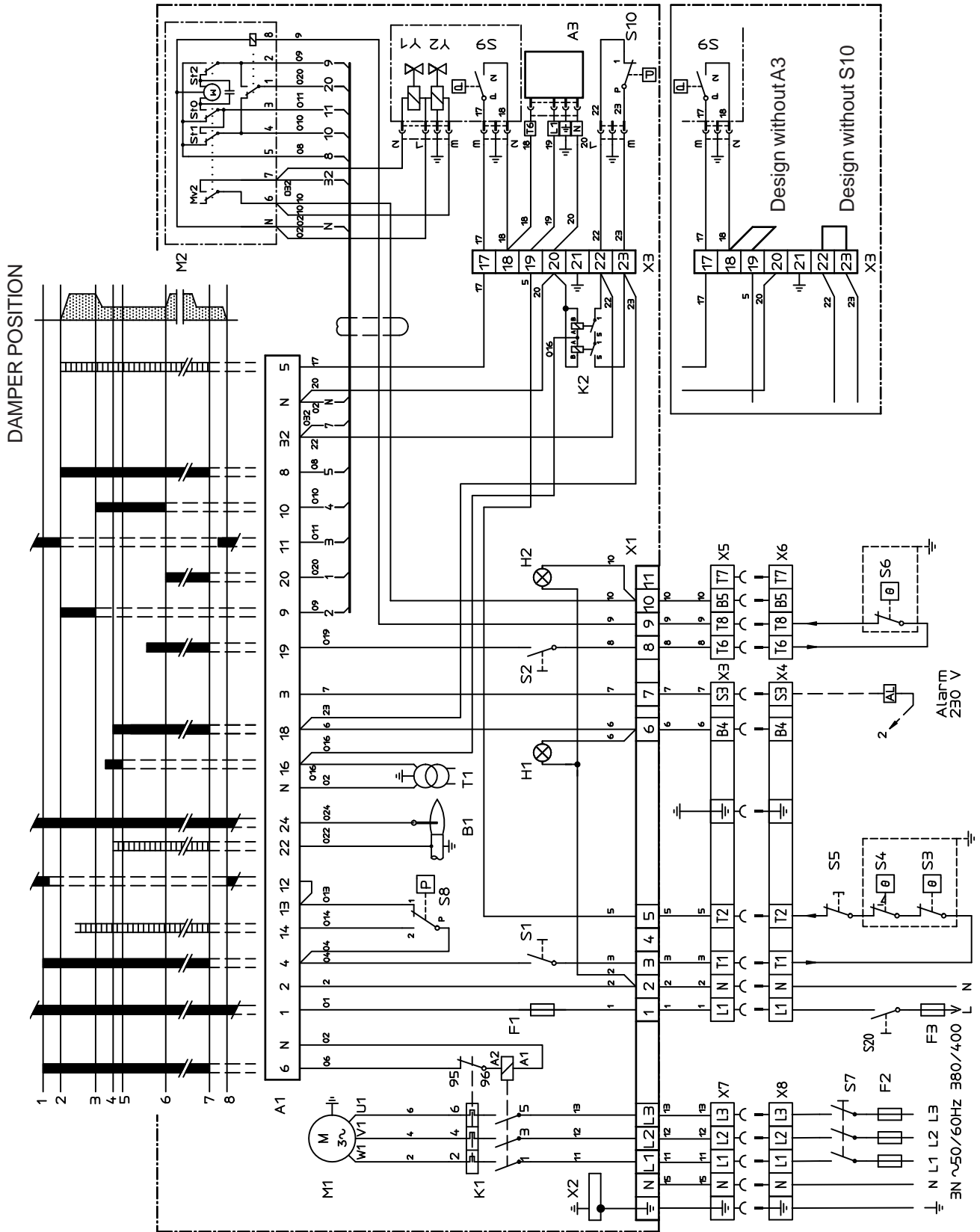
To switch to interface mode, hold the reset button depressed for more than 3 s. To return to normal mode, hold the reset button depressed for more than 3 s. If the firing unit is in the alarm mode, it is reset by pressing the reset button 0.5...3 s.

Connecting signal amplifier



ELECTRIC EQUIPMENT

Wiring diagram LFL1... (BG550/BG650) 2-Stage



ELECTRIC EQUIPMENT

List of components LFL1... (BG550/BG650) 2-Stage

A1	Gas burner control	S6	Control thermostat, stage 2
A3	Valve, leak tester, Dungs VPS 504	S7	Main switch 3-phase
B1	Ionization electrode	S8	Air pressure switch
F1	Operation fuse	S10	Gas pressure switch, max
F2	Operation fuse	S20	Main switch 1-phase
F3	Operation fuse	T1	Ignition transformer
H1	Lamp, low capacity	X1	Connection terminal board
H2	Lamp, high capacity (optional)	X2	Earth terminal
K1	Motor contactor with thermal overload protector	X3	Plug-in contact, burner
K2	Auxiliary relay	X4	Plug-in contact, boiler
M1	Burner motor	X5	Plug-in contact, stage 2, burner
M2	Damper motor, L&S SQN75.294A21B	X6	Plug-in contact, stage 2, boiler
S1	Operating switch	X7	Plug-in contact, 3-phase, burner
S2	Operating switch, stage 2	X8	Plug-in contact, 3-phase, boiler
S3	Control thermostat	S9	Gas pressure switch
S4	Temperature limiter	Y1	Gas solenoid valve 1
S5	Micro switch for hinged door	Y2	Gas solenoid valve 2

If S6 is missing, connection between T6 and T8.
Mains connection and fuse in accordance with local regulations.

Function LFL1...

1. Operating switch ON-Thermostat ON-Gas pressure switch ON-Air damper closed.

A control is made that the air pressure switch does **not** indicate fan pressure. Then the burner motor starts.

2. Air damper motor opens.

The air damper motor opens the damper to full load. A control is made that the air pressure switch indicates sufficient fan pressure.

3. Air damper motor closes.

The air damper motor closes to low load. Then the ignition spark is formed.

4. Main and safety valves open

The gas is ignited. The ionization electrode indicates a flame.

5. The safety time expires.

The ignition spark goes out. The safety time expires. If there is no flame or if for some reason the flame disappears after this time limit, the burner control locks out.

6. Operating position.

The burner is in operating position and can now change over to full load if the operating switch and the thermostat for full load are in position ON. The burner can alternate between full and low load depending on set temperature.

7. Stop.

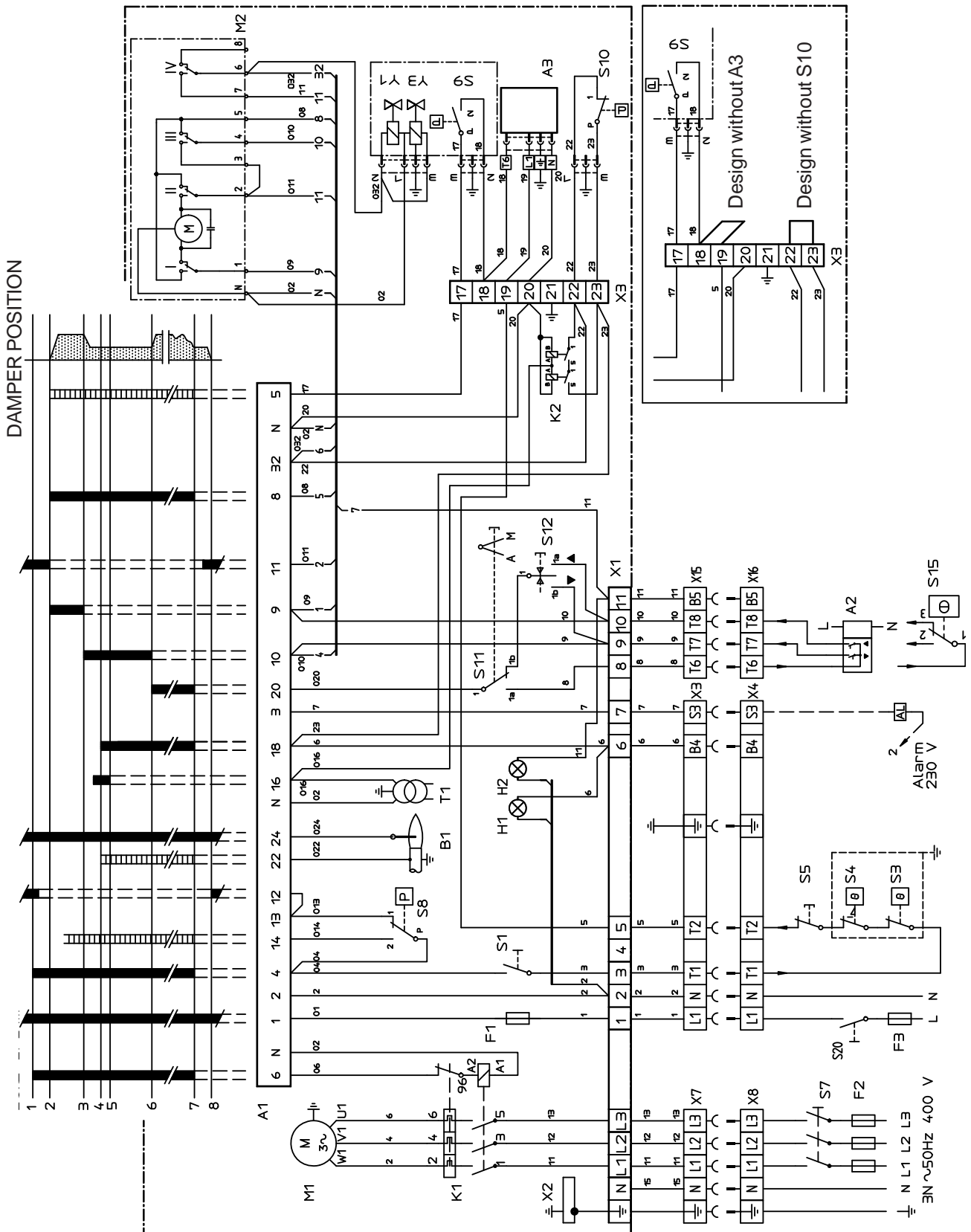
The operation of the burner can now be interrupted by means of the operating switch or the thermostat.

The control locks out.

The red lamp in the control is lit. Restart the burner by pressing the reset button.

ELECTRIC EQUIPMENT

Wiring diagram LFL1... (BG550/BG550LN/BG650) Modulating



ELECTRIC EQUIPMENT

List of components LFL1... (BG550/BG550LN/BG650) Modulating

A1	Gas burner control	S10	Gas pressure switch, max.
A2	Power control	S11	Change-over switch, Aut.-man.
A3	Valve, leak tester, Dungs VPS 504	S12	Change-over switch, Increase-Reduce
B1	Ionization electrode	S15	Control thermostat, 3-pole (only for 2-stage sliding)
F1	Operation fuse	S20	Main switch 1-phase
F2	Operation fuse	T1	Ignition transformer
F3	Operation fuse	X1	Connection terminal board
H1	Operating lamp	X2	Earth terminal
H2	Lamp, high capacity (optional)	X3	Plug-in contact, burner
K1	Motor contactor with thermal overload protector	X4	Plug-in contact, boiler
K2	Auxiliary relay	X7	Plug-in contact, 3-phase, burner
M1	Burner motor	X8	Plug-in contact, 3-phase, boiler
M2	Damper motor, L&S SQN75.664.A21B	X15	Plug-in contact, power controller, burner
S1	Operating switch	X16	Plug-in contact, power controller
S3	Control thermostat	S9	Gas pressure switch
S4	Temperature limiter	Y1	Gas solenoid valve 1
S5	Micro switch for hinged door	Y3	Safety solenoid valve
S7	Main switch 3-phase		
S8	Air pressure switch		

Mains connection and fuse in accordance with local regulations.

Function LFL1...

1. Operating switch ON-Thermostat ON-Gas pressure switch ON-Air damper closed.

A control is made that the air pressure switch does **not** indicate fan pressure. Then the burner motor starts.

2. Air damper motor opens.

The air damper motor opens the damper to max. position. A control is made that the air pressure switch indicates sufficient fan pressure.

3. Air damper motor closes.

The air damper motor closes to min. load position. Then the ignition spark is formed.

4. Main and safety valves open

The gas is ignited. The ionization electrode indicates a flame.

5. The safety time expires.

The ignition spark goes out. The safety time expires. If there is no flame or if for some reason the flame disappears after this time limit, the burner control locks out.

6. Operating position.

The burner is in operating position and can now change over to the capacity controlled by the regulator.

7. Stop.

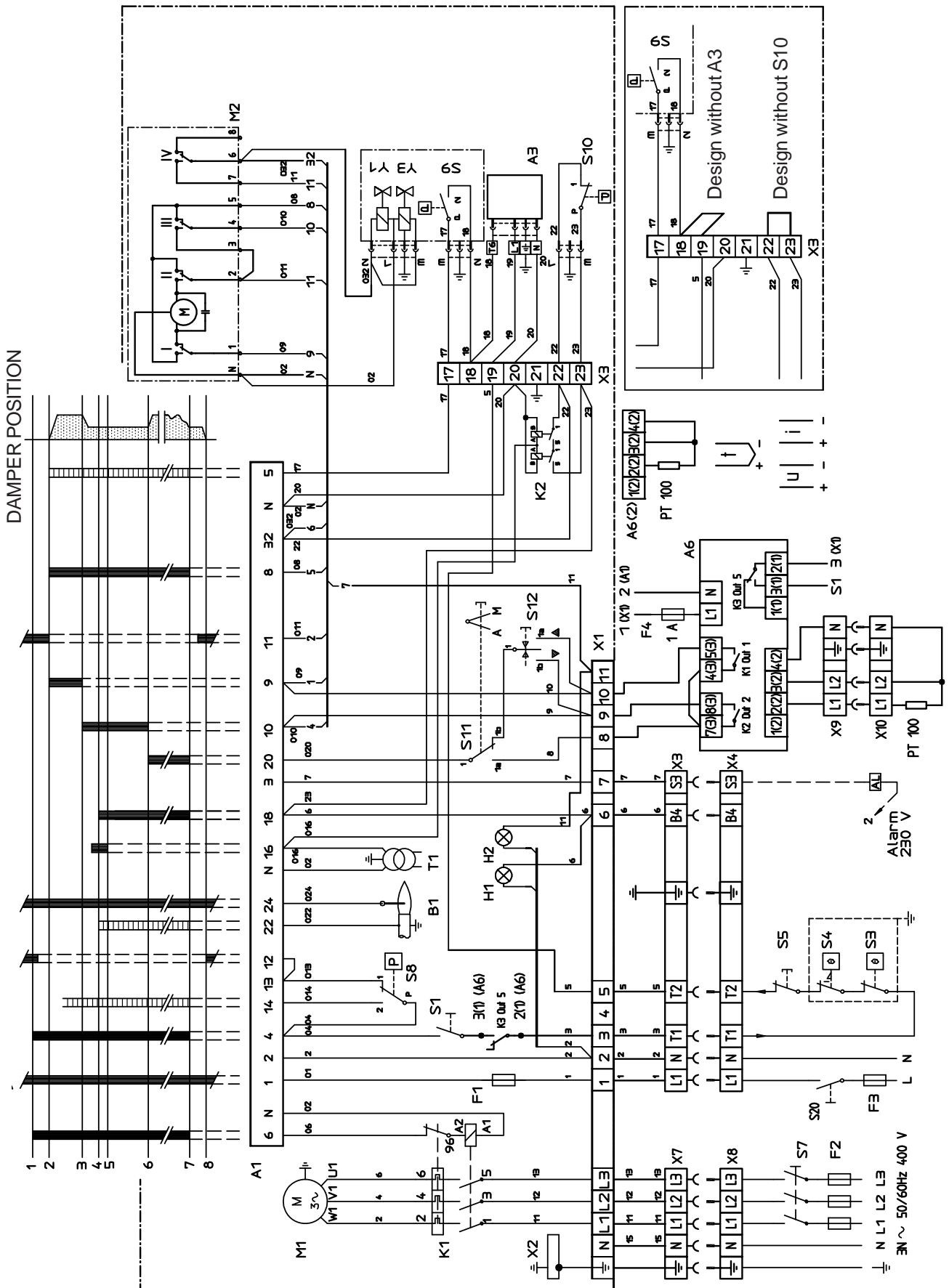
The operation of the burner can now be interrupted by means of the operating switch or the thermostat.

The control locks out.

The red lamp in the control is lit. Restart the burner by pressing the reset button.

ELECTRIC EQUIPMENT

Wiring diagram LFL1... (BG550/BG550LN/BG650) Modulating with R316



ELECTRIC EQUIPMENT

List of components LFL1... (BG550/BG550LN/BG650) Modulating with R316

A1	Gas burner control	S7	Main switch 3-phase
A3	Valve, leak tester, Dungs VPS 504	S8	Air pressure switch
A6	Power control R316	S10	Gas pressure switch, max.
A6(2)	PT 100-sensor, Thermocouple, current/voltage	S11	Change-over switch, Aut.-man.
B1	Ionization electrode	S12	Change-over switch, Increase- Reduce
F1	Operation fuse	S20	Main switch 1-phase
F2	Operation fuse	T1	Ignition transformer
F3	Operation fuse	X1	Connection terminal board
F4	Operating fuse 1A	X2	Earth terminal
H1	Operating lamp	X3	Plug-in contact, burner
H2	Lamp, high capacity (optional)	X4	Plug-in contact, boiler
K1	Motor contactor with thermal overload protector	X7	Plug-in contact, 3-phase, burner
K2	Auxiliary relay	X8	Plug-in contact, 3-phase, boiler
M1	Burner motor	X9	Plug-in contact, power controller R316, burner
M2	Damper motor, L&S SQN75.664.A21B	X10	Plug-in contact, power controller R316
S1	Operating switch	S9	Gas pressure switch
S3	Control thermostat	Y1	Gas solenoid valve 1
S4	Temperature limiter	Y3	Safety solenoid valve
S5	Micro switch for hinged door		

Mains connection and fuse in accordance with local regulations.

Function LFL1...

1. Operating switch ON-Thermostat ON-Gas pressure switch ON-Air damper closed.

A control is made that the air pressure switch does **not** indicate fan pressure. Then the burner motor starts.

2. Air damper motor opens.

The air damper motor opens the damper to max. position. A control is made that the air pressure switch indicates sufficient fan pressure.

3. Air damper motor closes.

The air damper motor closes to min. load position. Then the ignition spark is formed.

4. Main and safety valves open

The gas is ignited. The ionization electrode indicates a flame.

5. The safety time expires.

The ignition spark goes out. The safety time expires. If there is no flame or if for some reason the flame disappears after this time limit, the burner control locks out.

6. Operating position.

The burner is in operating position and can now change over to the capacity controlled by the regulator.

7. Stop.

The operation of the burner can now be interrupted by means of the operating switch or the thermostat.

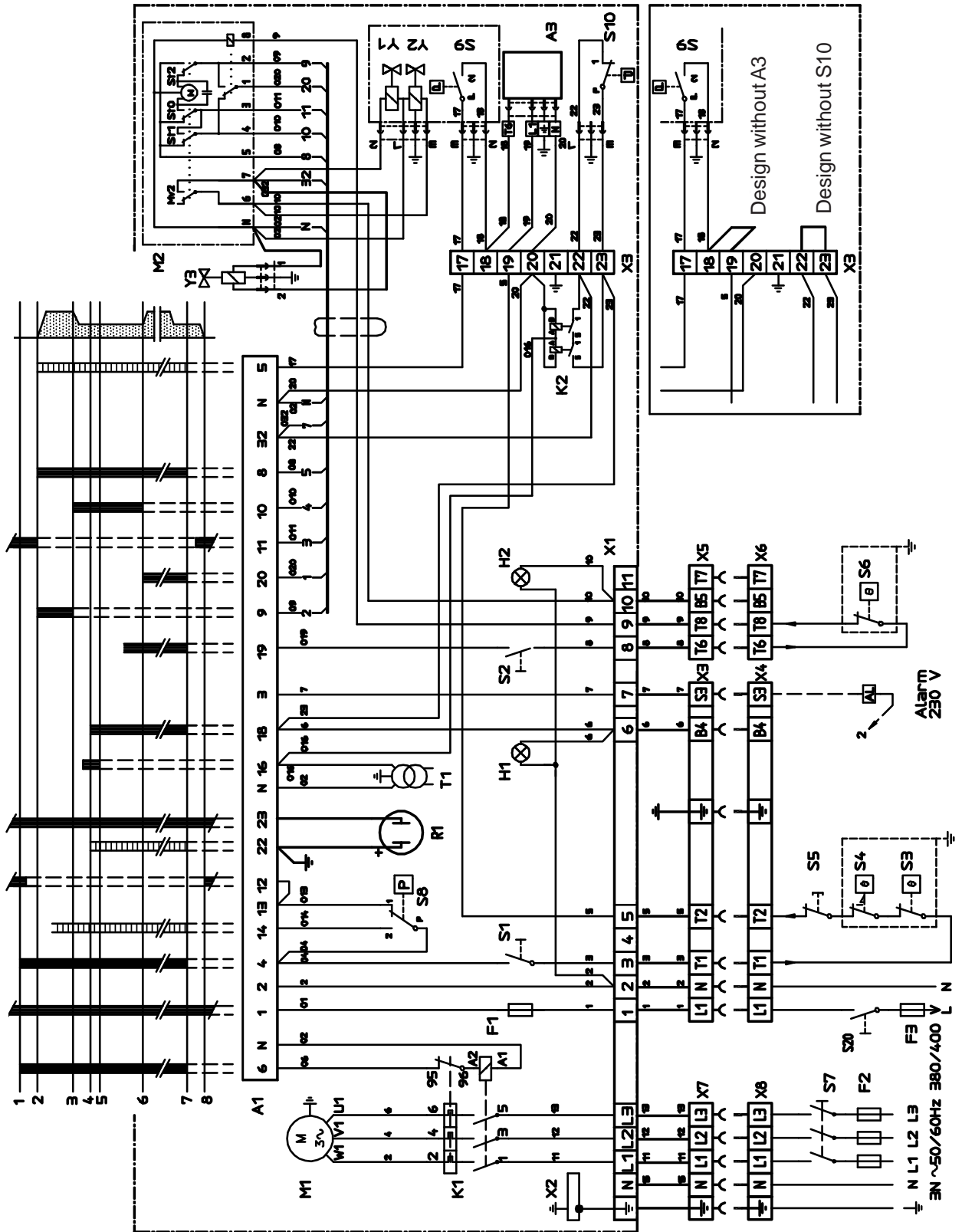
The control locks out.

The red lamp in the control is lit. Restart the burner by pressing the reset button.

ELECTRIC EQUIPMENT

Wiring diagram LFL1... (BG550/BG650) 2-Stage

DAMPER POSITION



ELECTRIC EQUIPMENT

List of components LFL1... (BG550/BG650) 2-Stage

A1	Gas burner control	S6	Control thermostat, stage 2
A3	Valve, leak tester, Dungs VPS 504	S7	Main switch 3-phase
R1	UV-Detector	S8	Air pressure switch
F1	Operation fuse	S10	Gas pressure switch, max
F2	Operation fuse	S20	Main switch 1-phase
F3	Operation fuse	T1	Ignition transformer
H1	Lamp, low capacity	X1	Connection terminal board
H2	Lamp, high capacity (optional)	X2	Earth terminal
K1	Motor contactor with thermal overload protector	X3	Plug-in contact, burner
K2	Auxiliary relay	X4	Plug-in contact, boiler
M1	Burner motor	X5	Plug-in contact, stage 2, burner
M2	Damper motor, L&S SQN75.294A21B	X6	Plug-in contact, stage 2, boiler
S1	Operating switch	X7	Plug-in contact, 3-phase, burner
S2	Operating switch, stage 2	X8	Plug-in contact, 3-phase, boiler
S3	Control thermostat	S9	Gas pressure switch
S4	Temperature limiter	Y1	Gas solenoid valve 1
S5	Micro switch for hinged door	Y2	Gas solenoid valve 2
		Y3	Safety solenoid valve

If S6 is missing, connection between T6 and T8.

Mains connection and fuse in accordance with local regulations.

Function LFL1...

1. Operating switch ON-Thermostat ON-Gas pressure switch ON-Air damper closed.

A control is made that the air pressure switch does **not** indicate fan pressure. Then the burner motor starts.

2. Air damper motor opens.

The air damper motor opens the damper to full load. A control is made that the air pressure switch indicates sufficient fan pressure.

3. Air damper motor closes.

The air damper motor closes to low load. Then the ignition spark is formed.

4. Main and safety valves open

The gas is ignited. The ionization electrode indicates a flame.

5. The safety time expires.

The ignition spark goes out. The safety time expires. If there is no flame or if for some reason the flame disappears after this time limit, the burner control locks out.

6. Operating position.

The burner is in operating position and can now change over to full load if the operating switch and the thermostat for full load are in position ON. The burner can alternate between full and low load depending on set temperature.

7. Stop.

The operation of the burner can now be interrupted by means of the operating switch or the thermostat.

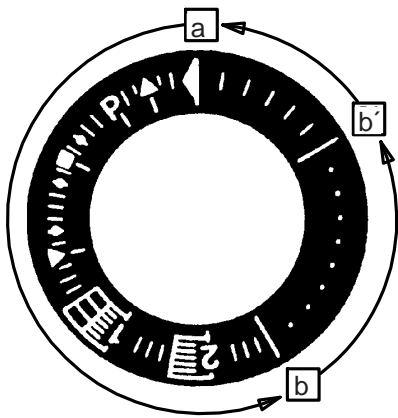
The control locks out.

The red lamp in the control is lit. Restart the burner by pressing the reset button.

ELECTRIC EQUIPMENT

Control programme under fault conditions and lockout indication LFL1....

In the event of fault conditions the fuel supply is always interrupted immediately and, simultaneously, the sequence switch stops and thus the lockout indicator. The symbol appearing above the reading mark indicates the kind of fault:



- ◀ **No start,**
because, e.g., the CLOSE signal has not been supplied to terminal 8 or a contact has not been closed between terminals 12 and 4 or 4 and 5.
- ▲ **Interruption of the start-up sequence,**
because the OPEN signal has not been supplied to terminal 8 from damper motor to switch «max.». Terminals 6, 7 and 14 are under tension until the fault has been remedied.
- P Lockout,**
because the air pressure signal has not been received at the start of the air pressure check. **Any air pressure failure after this point in time also causes the control to go to lockout!**
- **Lockout**
due to a fault in the flame supervision circuit.
- ▼ **Interruption of the start-up sequence,**
because the position signal for the low-flame position has not been supplied to terminal 8 by the damper motor. Terminals 6, 7 and 14 are under tension until the fault has been remedied.
- 1 Lockout**
because no flame signal has been received on completion of the 1st safety time. **Any flame signal failure after completion of the first safety time also causes the control to go to lockout!**
- 2 Lockout,**
because no flame signal has been received on completion of the 2nd safety time (flame signal of the main flame with interrupted pilot burners).
- | **Lockout,**
because the flame signal has been lost during burner operation or air pressure failure has occurred.
- ◀ **Lockout on completion of control programme sequence**
due to extraneous light (e.g. flame not extinguished, leaking fuel valves) or due to a faulty flame signal

a - b Start-up sequence

b - b' "idle steps" up to the self shut-down of the sequence switch

b (b') - a Post-purge sequence

Technical data LFL1...

Pre-purge time with full air volume:	31,5 s
Pre-ignition time:	6 s
Safety time:	3 s
Post-ignition time:	3 s
Reset after lock-out	Immediately
Time of re-start:	18 s
Ambient temperature:	-20°C to +60°C
Protective standard:	IP 40

Supervision of ionization current

Voltage at the detector electrode	operation: 330V ± 10%
	test: 380V ± 10%
Short circuit current	max. 0,5 mA
Min. required ionization current	6 µA
Recommended range of measuring device	0...50 µA

MEASURES AND CHECKS BEFORE START-UP

2-Stage or modulating burners

General rules

Care should be taken by the installer to ensure that no electrical cables or fuel/gas pipes are trapped or damaged during installation or service/maintenance.

Inner assembly

Ensure that the ignition and ionisation electrodes are correctly adjusted. The sketch (see separate page) shows the correct measurements.

Gas quality

Ensure that the burner head is meant for the gas quality to be used (see fig.).

Venting

The gas line is vented by loosening the screw on the test nipple for the inlet pressure. Connect a plastic hose and conduct the gas into the open air. **After having vented the gas line tighten the screw again.**

Electric function test:

Ensure that phase and neutral are not reversed. The gas shut-off cock should be closed. To prevent the gas pressure switch from locking out, it should be linked temporarily.

After the main switch has been switched on and the thermostats have been adjusted, the pre-purging period begins (30-35sec.). At the end of this period the pre-ignition period starts (0,5-2,5 sec. depending on the design of the gas control). The gas valve is energized and opens and flame is established. At the end of the safety time (2-3 sec.) the gas control locks out. The solenoid valve and the motor will be "dead". Remove the link from the gas pressure switch after the test is finished.

Note on 2-stage and modulating burners that during the pre-purging period the damper opens to the set value for air on stage 2 and just before the end of the pre-purging period it goes down to the air setting for stage 1. On some burners under 350kW the pre-purging mainly takes place with the air damper set for stage 1.

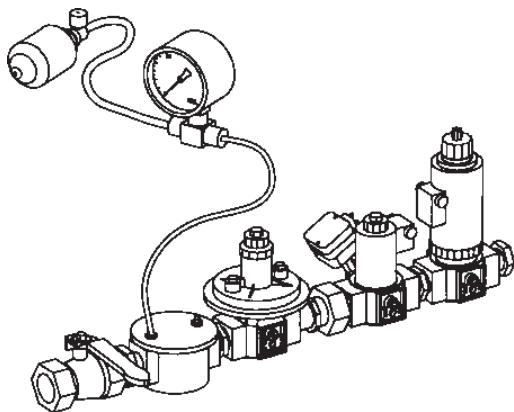
NOTE! Applies only to gas burner control LFL1.

When using LPG (Propane) the burner should be connected for post-purging. Move the connection on terminal 6 to terminal 7 in the base of LFL1.

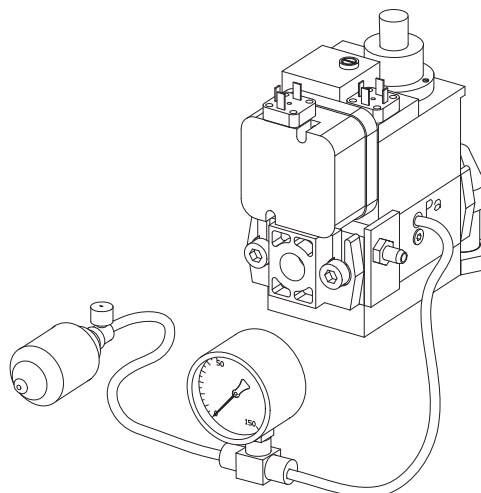
Leakage control

When making a leakage control of the gas supply system, the solenoid valve should be closed. Connect a pressure gauge to the test nipple Pa, see fig. The test pressure in the system should be 1,5x max. inlet pressure or min. 150 mbar. If any leakage, locate the source by means of soapy water or a leak location spray. After tightening repeat the test.

Gas train



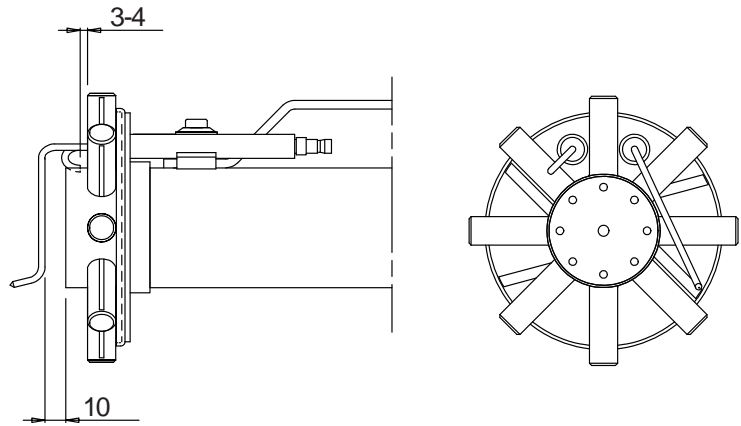
Multibloc



MEASURES AND CHECKS BEFORE START-UP

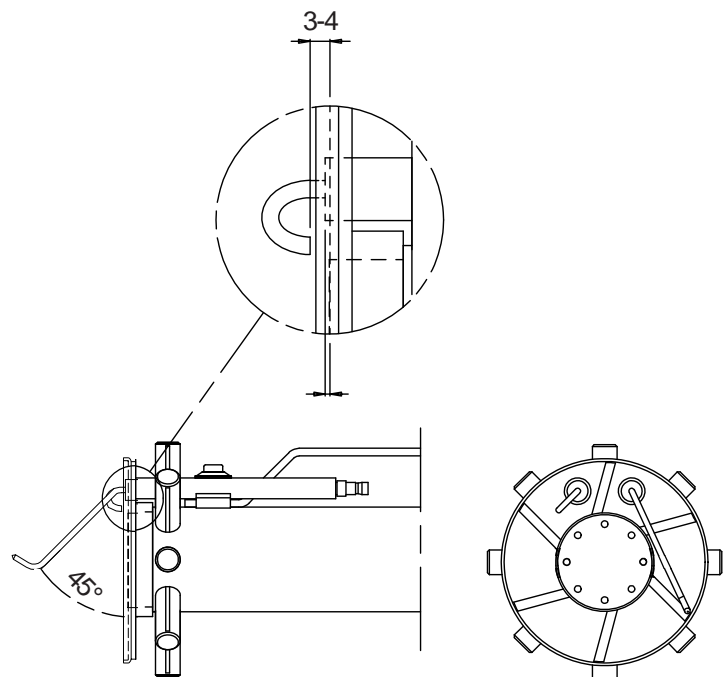
Inner assembly

Town gas



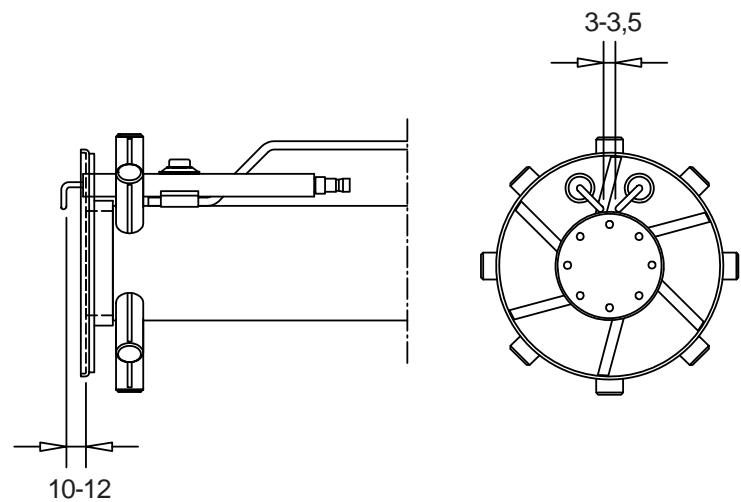
Inner assembly

Natural gas, LPG



Inner assembly

Biogas ((UV-detector)



MEASURES AND CHECKS BEFORE START-UP

Inner assembly BG 550LN

A = 10 mm Front edge Brake plate

B = 3 mm



A = Position Ionisation detector

B = Position Ignition electrode



DETERMINATION OF GAS VOLUME FOR THE INSTALLATION

Specifications on natural gas, town gas and biogas vary. For more exact information please contact the gas distributor.

Gas quality	Net calorific value		
	kWh/Nm ³	kJ/Nm ³	kcal/Nm ³
Natural gas	10.3	37 144	8 865
Propane	26.0	93 647	22 350
Butane	34.3	123 571	29 492
Town gas	4.9	17 653	4 213
Biogas	7.0	25 219	6 019

Example how to calculate the gas volume (natural gas)

V = Gas volume Nm³/h

Q = Boiler output 120 kW

H_u = Calorific value of the gas A. 37 144 kJ/Nm³, B. 10.3 kWh/ Nm³

η = Expected efficiency 90%

$$\text{Ex. A } v = \frac{Q \cdot 3600}{H_u \cdot \eta} = \frac{120 \cdot 3600}{37144 \cdot 0,90} \approx 12,9 \text{ Nm}^3/\text{h}$$

$$\text{Ex. B } v = \frac{120}{10,3 \cdot 0,90} \approx 12,9 \text{ Nm}^3/\text{h}$$

If the barometer height, pressure and temperature of the gas deviate considerably from the normal values this must be taken into account as follows:

$$f = \frac{273+t}{273} \cdot \frac{1013,25}{B+P_u}$$

t = Temperature of the gas at the gas meter (15°C)

B = Barometer height (945 mbar)

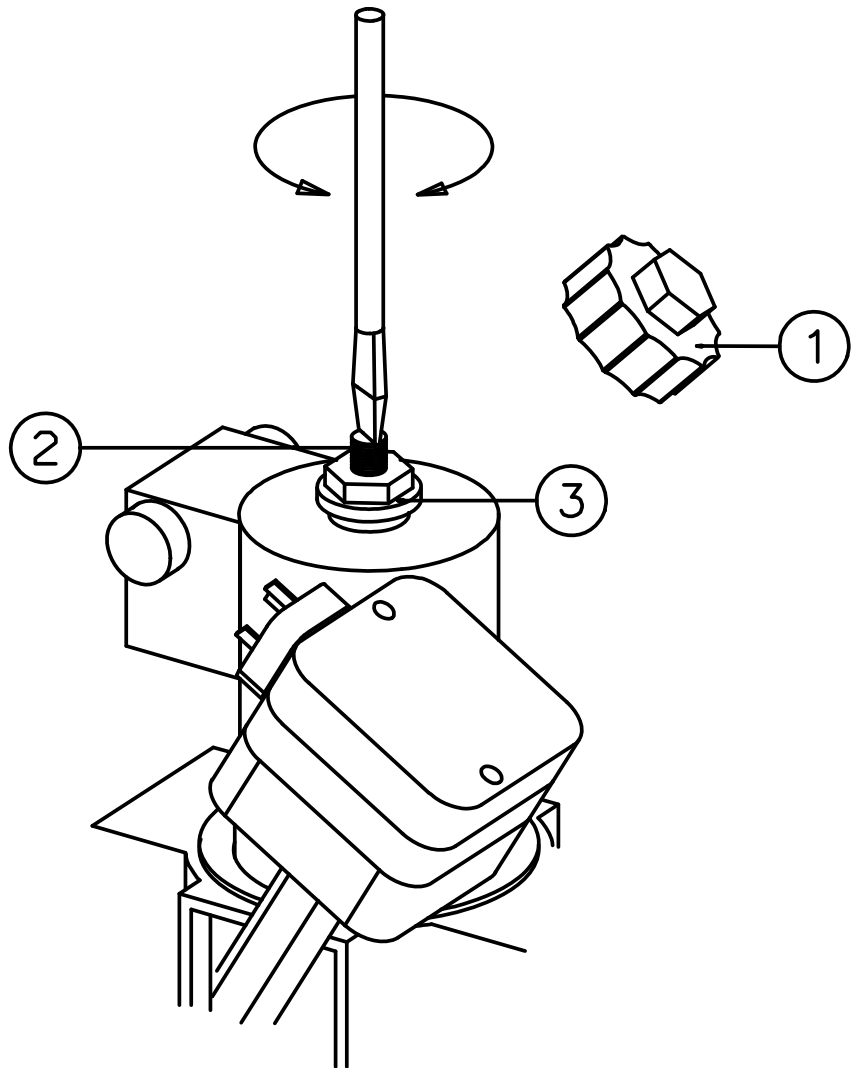
P_u = Pressure of the gas at the gas meter (15,0 mbar)

$$f = \frac{273+15}{273} \cdot \frac{1013,25}{945+15}$$

$$f \approx 1.11$$

The gas volume read on the gas meter actually reads $1,11 \cdot 12,9 = 14,4 \text{ m}^3/\text{h}$.

GAS SOLENOID VALVE MVD



MVD:

1-step valve fast opening with max. flow adjustment.

1. Protection cover
2. Flow adjustment
3. Lock nut

Flow adjustment MVD/5

Remove protection cover 1. Loosen lock nut 3. Turn the flow adjustment screw 2 to the right = gas flow decreases or to the left = gas flow increases. Tighten the lock nut.

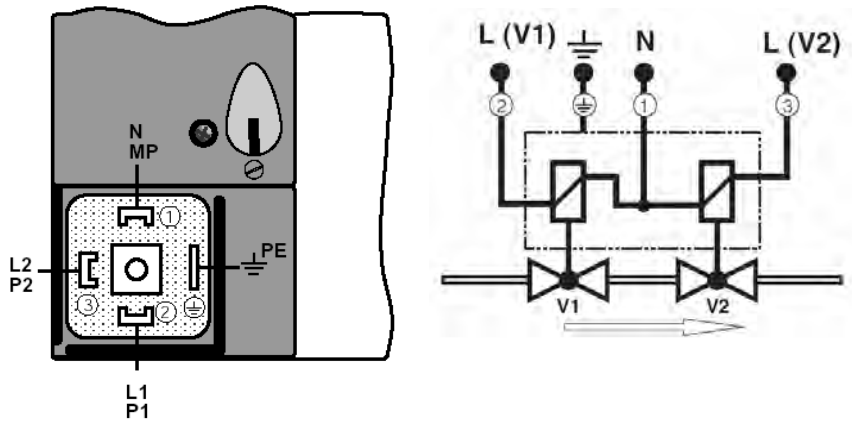
OPERATION AND ASSEMBLY INSTRUCTIONS

Double solenoid valve Type DMV-D.../11 Type DMV-DLE.../11

Nominal widths

Rp 1/2 - Rp 2

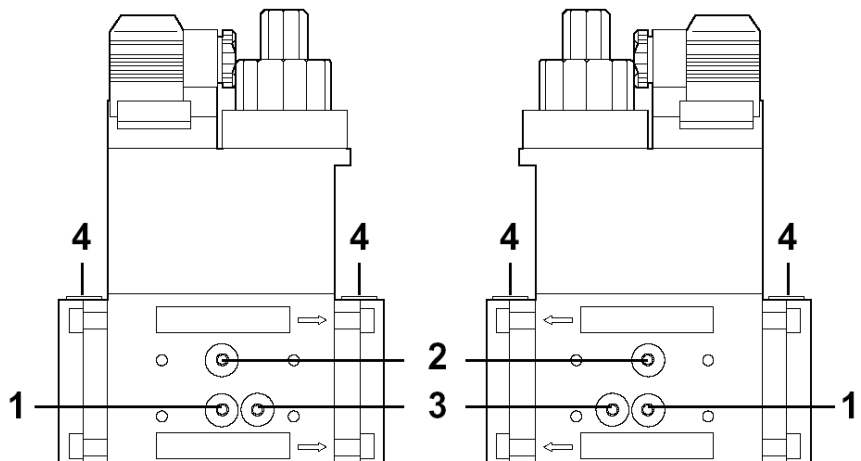
Electrical connection IEC 730-1 (VDE 0631 T1)



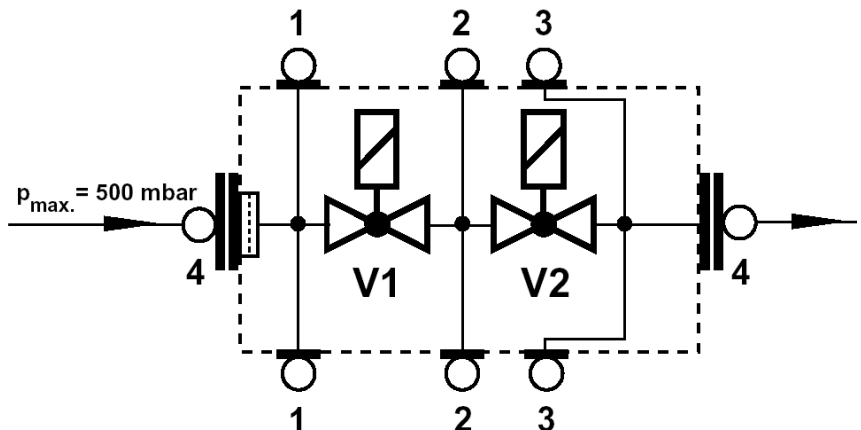
Volt	U n ~(AC) 230 V
Valve	2 x Class A
Ambient temperature	-15 °C ... +60 °C
IP	54
Family	1 + 2 + 3
Max. operating pressure	500 mbar

DMV 505-520/11

Pressure taps 1, 2, 3, 4 Sealing plug



Screw plugs 1,2,3 may also be replaced by a measuring socket G 1/8 DIN ISO 228.
Concealed connecting bore for system accessories.

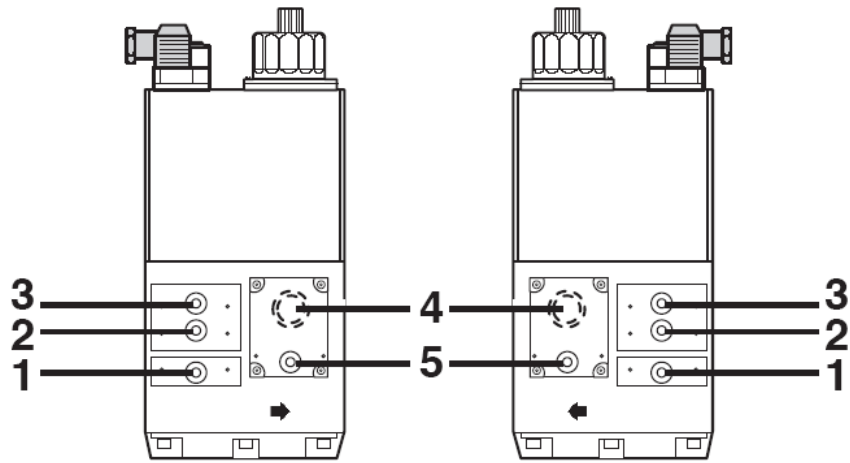


OPERATION AND ASSEMBLY INSTRUCTIONS

DMV 525/11

Pressure taps 1, 2, 3, 5 Sealing plug

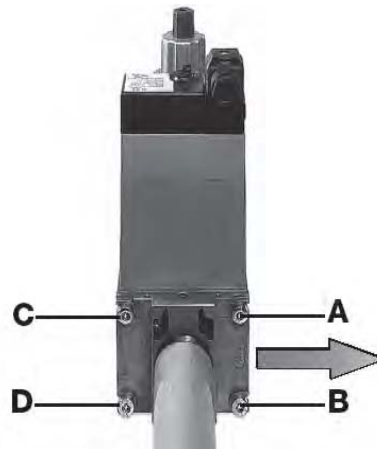
Screw plugs 1,2,3 and 5 may also be replaced by a measuring socket G 1/8 DIN ISO 228.



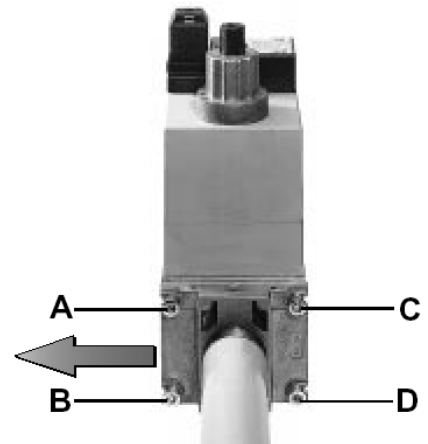
1. Loosen screws A and B **do not** remove. Figs 1 and 2

2. Remove screws C and D. Figs 1 and 2

1.



2.



3. Remove double solenoid valve between the threaded flanges. Figs 3 and 4

3.



4.



4. After mounting, perform leakage and functional tests.

5.



6.



6. **DMV - D 507/11 - 525/11 DMV-DLE 507/11 - 525/11 Main flow setting only possible at V1!**

Set main volume on open valve.
Set valve V1 during operation.
Check setting values continuously.
Smallest setting volume flow:

$$\dot{V}_{\text{min./mini.}} > 0.1 \times \dot{V}_{\text{max./maxi.}}$$

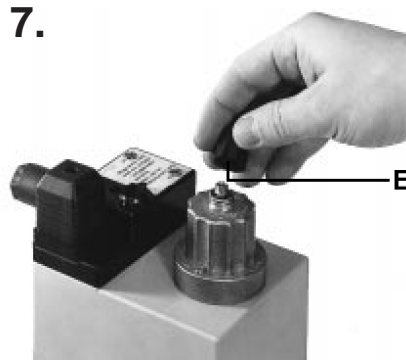
OPERATION AND ASSEMBLY INSTRUCTIONS

7. DMV-DLE

Rapid stroke adjustment \checkmark start

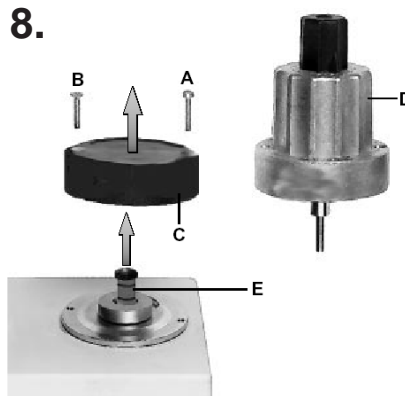
Factory setting DMV-DLE: Rapid stroke not adjusted

1. Unscrew the adjustment cap E from the hydraulic brake.
2. Turn the adjustment cap and use as a tool.
3. Turn a-clockwise = increase rapid stroke (+).



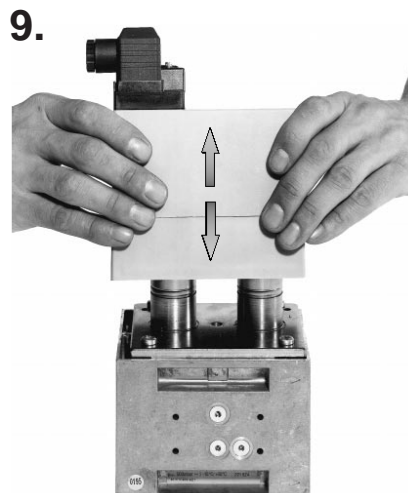
8. Replacing hydraulic brake unit or adjustment plate

1. Switch off firing system.
2. Remove locking varnish from countersunk screw A.
3. Unscrew countersunk screw A.
4. Unscrew socket headscrew B.
5. Raise adjustment plate C or hydraulic brake D.
6. Remove sealing plug E
7. Exchange adjustment plate C or hydraulic brake D
8. Screw in countersunk and socket head screw. Only tighten socket head screw so that hydraulic brake can just be turned.
9. Coat countersunk screw A with locking varnish.
10. Leakage test: Pressure tap at sealing plug 2:
DMV 507-520/11 Pressure tap at sealing plug 3:
DMV 525/11 p max. = 500 mbar.
11. Perform functional test.
12. Switch on firing system.



9. Replacing the solenoid Versions with adjusting plate DMV-D 5.../11 or hydraulic brake DMV-DLE 5.../11

1. Remove hydraulic brake or adjusting plate as described on page 8:1-5 "Replacing the hydraulic brake or adjusting disk", steps 1 -5.
2. Replace solenoid
Important: Make sure that the solenoid no. and voltage are correct!
3. Remount hydraulic brake or adjusting plate as described on page 8:7-11.
"Replacing the hydraulic brake or adjusting plate", steps 7 -11.



OPERATION AND ASSEMBLY INSTRUCTIONS

Gas pressure regulator Type FRS

Nominal diameters

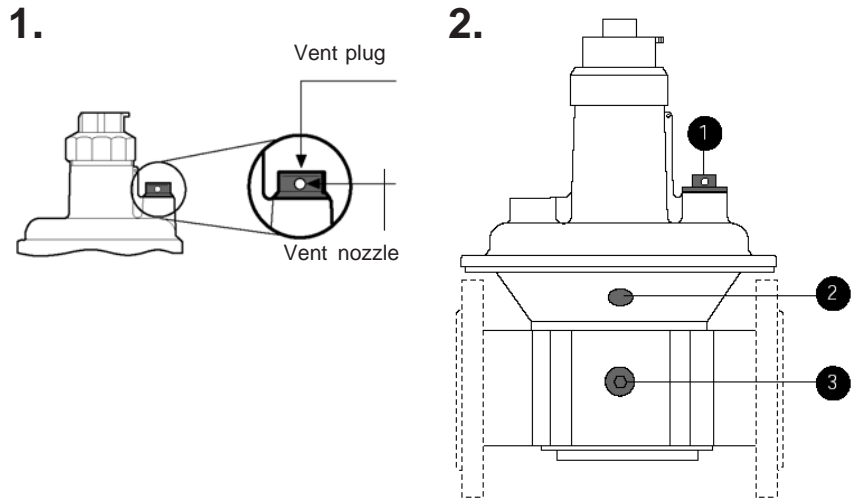
Rp 3/8 - Rp 2 1/2

DN 40 - DN 150

Never close vent nozzle!

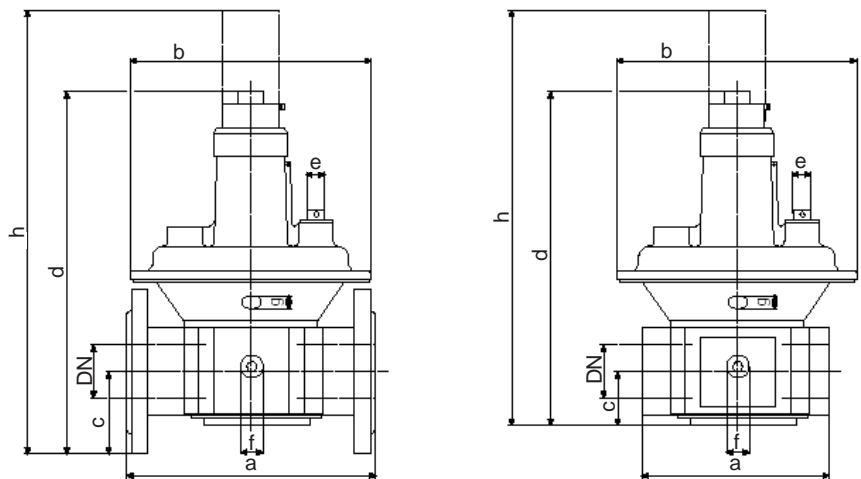
2. Pressure taps

1. Vent plug
2. Connection for external pulse
G 1/4 screw plug ISO 228, on both sides, optional.
3. G 1/4 screw plug ISO 228, in inlet pressure range, on both sides



Max. operating pressure	500 mbar
Pressure regulator	Class A
Ambient temperature	-15 °C ... +70 °C
Inlet pressure range	5 - 500 mbar
Family	1 + 2 + 3
Outlet pressure range	2,5 - 200 mbar

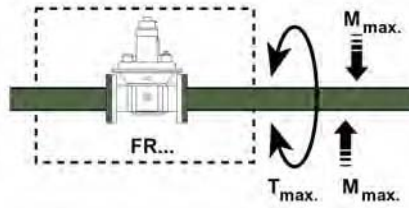
Dimensions [mm]



Type	Order Number	p _{max.} [mbar]	Rp / DN	Dimensions [mm]							Weight [kg]	
				a	b	c	d	e	f	g	h	
FRS 507	070 391	500	Rp 3/4	100	130	28	165	G1/4	G1/4	G1/8	245	1,00
FRS 510	070 409	500	Rp 1	110	145	33	190	G1/4	G1/4	G1/8	310	1,20
FRS 515	058 446	500	Rp 1 1/2	150	195	40	250	G1/2	G1/4	G1/4	365	2,50
FRS 520	058 628	500	Rp 2	170	250	47	310	G1/2	G1/4	G1/4	450	3,50
FRS 525	083 303	500	Rp 2 1/2	230	285	60	365	G1/2	G1/4	G1/4	550	6,00
FRS 5065	058 792	500	DN 65	290	285	95	405	G1/2	G1/4	G1/4	590	7,50
FRS 5080	079 681	500	DN 80	310	285	95	405	G1/2	G1/4	G1/4	590	10,00

OPERATION AND ASSEMBLY INSTRUCTIONS

Do not use unit as lever.



DN					40	50	65	80	100	125	150
Rp	3/8	1/2	3/4	11	1/2	2	2 1/2	--	--	--	--
M _{max.} (Nm) ≤ 10s	70	105	225	340	610	1100	1600	2400	5000	6000	7600
T _{max.} (Nm) ≤ 10s	35	50	85	125	200	250	325	400	--	--	--

Adjustment of outlet pressure (setpoint adjustment)

Factory setting: Standard spring p 2 10-30 mbar

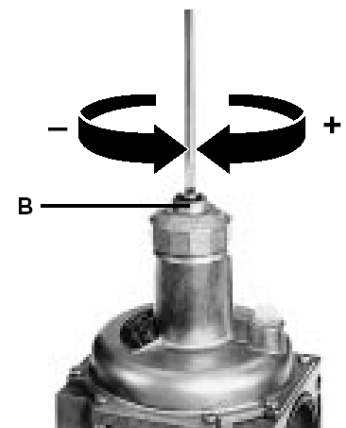
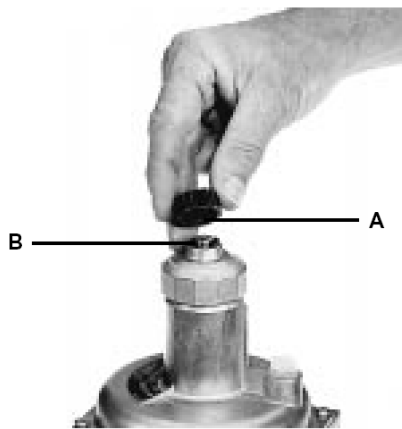
1.

1. Unscrew protective cap A.
2. Adjustment (+) Setting spindle B
"Turn counter-clockwise" =
Increasing outlet pressure
(setpoint)

or

2.

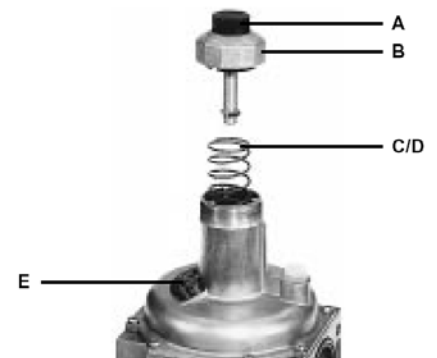
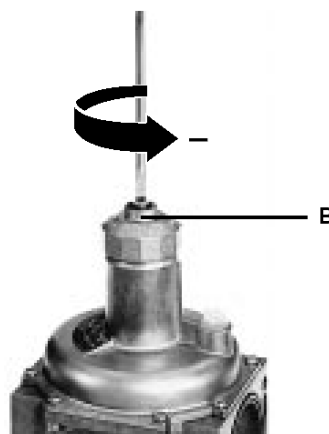
- Adjustment (-)
Setting spindle B
"Turn clockwise" =
Reducing outlet pressure
(setpoint)
4. Check setpoint
5. Screw on protective cap A.



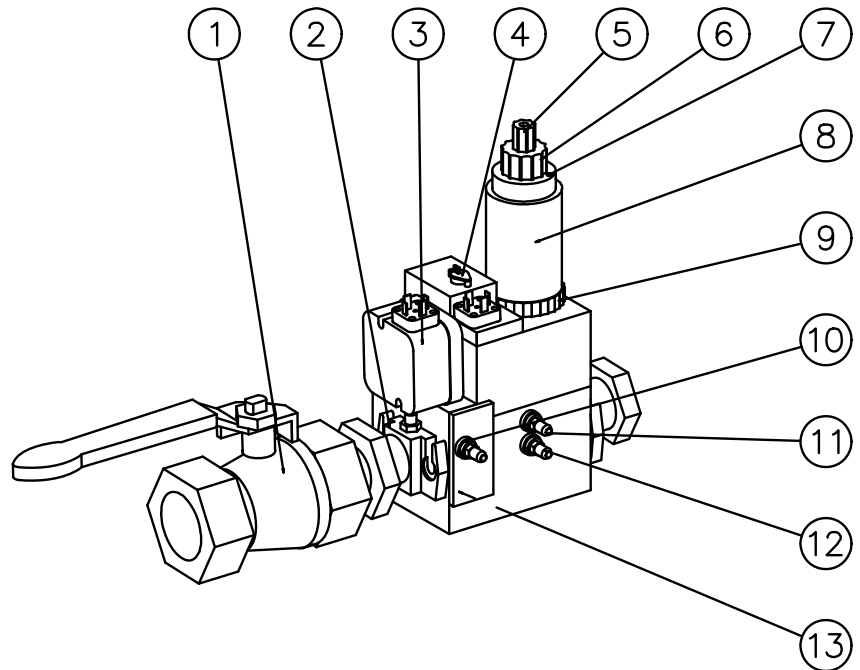
Replace setting spring

3-4

1. Remove protective cap. A.
Release spring by turning
adjustment
spindle B counter clockwise.
Turn spindle to stop.
2. Unscrew complete adjustment
device B and remove spring C.
3. Insert new spring D.
4. Assemble complete adjustment
device and adjust desired off-set.
5. Screw on protective cap A.
Stick adhesive label E onto type-
plate.



MULTI-BLOC, MB-ZRDLE 405 - 420 B01



1. Ball valve
2. Fixing flange
3. Gas pressure switch
4. Governor with pressure adjustment
5. Protective cover, start gas adjustment
6. Hydraulic device, adjustment of stage 2
7. Lock screw for flow adjustment
8. Main valve
9. Knob for adjustment of stage 1
10. Test nipple, inlet pressure
11. Test nipple, pressure after governor
12. Test nipple, before governor
13. Filter

Max. inlet pressure: 360 mbar. Adjustable governor pressure:

405 - 412 S50 = 4 - 50 mbar

415 - 420 S20 = 4 - 20 mbar

415 - 420 S50 = 20 - 50 mbar

Solenoid valve: Slow opening valves with adjustable start load, stage 1 and stage 2.

MULTI-BLOC, MB-ZRDLE 405 - 420 B01

Flow adjustment 2-stage design

For stage 1, loosen the lock screw a. Turn the hydraulic device e:
to the right = the gas flow is reduced
to the left = the gas flow is increased

For stage 2, turn the hydraulic device b:
to the right = the gas flow is reduced
Åt vänster = the gas flow is increased

Do not forget to tighten the lock screw again.

Adjustment of governor

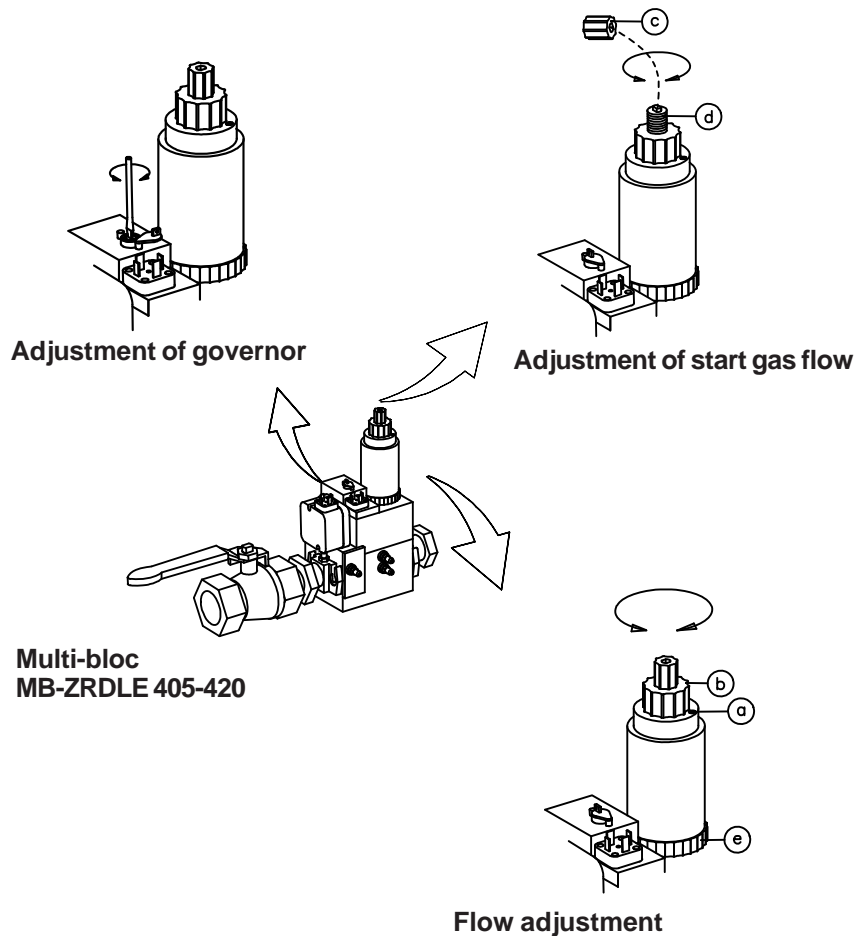
Adjust outlet pressure from governor by means of a screw driver. Min. and max. outlet pressures correspond to appr. 60 turns of the spring. It is not possible to change pressure springs in order to change the outlet pressure.

Turn to the right = the outlet pressure is increased
Turn to the left = the outlet pressure is reduced

Adjustment of start gas flow

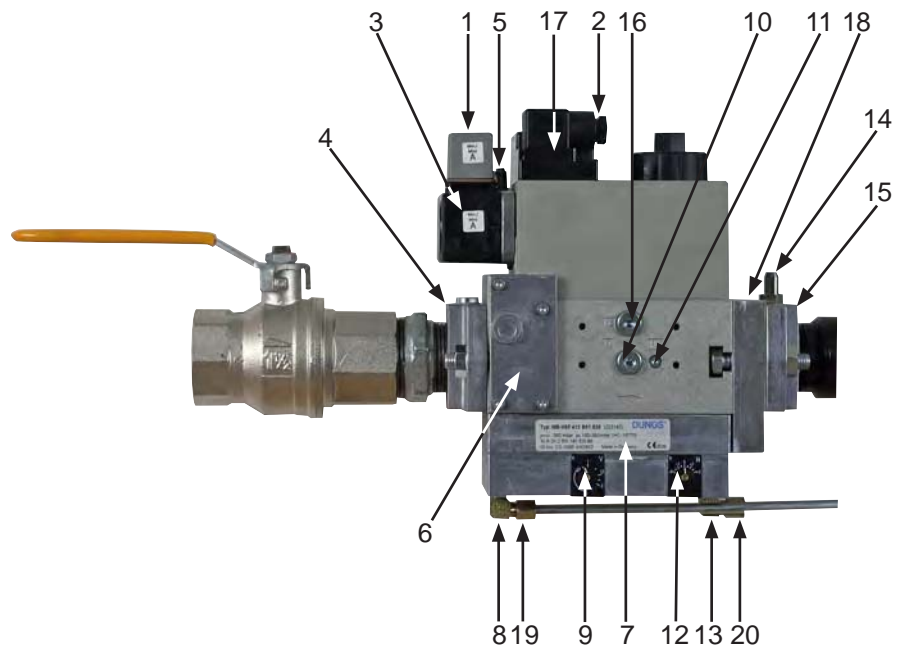
Remove the protective cover c.
Turn the adjustment knob d (use the protective cover as a tool) to the desired start gas flow.

Turn to the right = the start gas flow is reduced
Turn to the left = the start gas flow is increased



MULTI-BLOC, MB-VEF 412 - 425 B01

View



1. Electrical connection gas pressure switch mini
2. Electrical connection gas valve
3. Pressure switch mini
4. Flange connection inlet
5. Test point connection 1/8" before V_1
6. Filter (on Multi-Bloc 425 external filter)
7. Data plate
8. Connection 1/8" P_L
9. Adjustment screw V for ratio $P_{Br} : P_L$ (max. load)
10. Test point connection 1/8" before V_1 (before governor)
11. Connection M4 for measurement of burner pressure after V_2
12. Adjustment screw for zero point adjustment N (min. load)
13. Test point connection 1/8" P_F
14. Test point connection 1/8" P_{Br}
(after V_2 burner)
15. Flange connection, outlet
16. Test point connection 1/8" P_a before V_2 (after governor)
17. Indication of V_1 and V_2 in operation (not standard)
18. Impulse flange P_{Br} (gas pressure)
19. Impulse line P_L (air pressure)
20. Impulse line (fire room)

It is possible to connect a leakage control VPS 504 and a gas pressure switch maxi.

MULTI-BLOC, MB-VEF 412 - 425 B01

Technical data

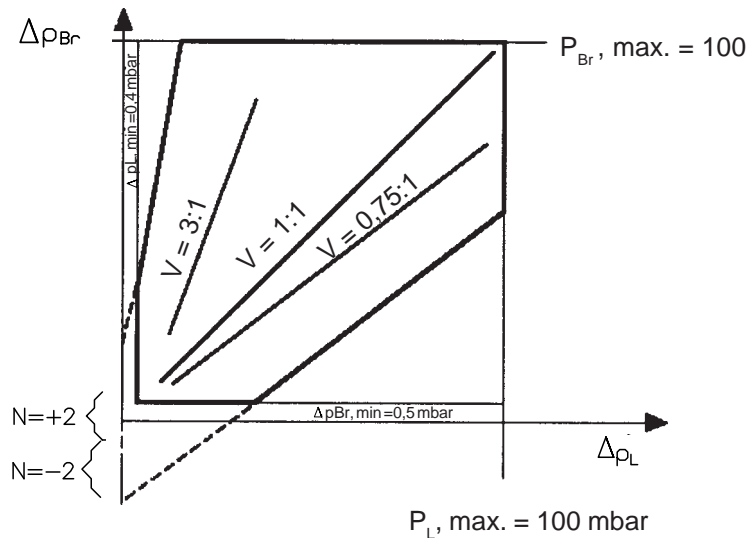
- Max inlet pressure 360 mbar
- Valves V_1+V_2 class A group 2 in accordance with EN 161
- Governor class A group 2 in accordance with EN88
- Ratio $V_{P_{Br}}:P_L$ 0,75:1-3:1
- Filter according to DIN 3386
- Ambient temperature $-15^{\circ}\text{C} - +70^{\circ}\text{C}$
- Protection standard type IP54 (according to IEC 529, DIN 40050)
- Gas family 1 +2 +3
- Outlet pressure 0,5 - 100 mbar
- Zero point adjustment $N \pm 2$ mbar
- Pressure switch DIN3398 TI
- Fan pressure P_L 0,4-100 mbar
- Fire room pressure P_F -2 -+5mbar
- Burner pressure P_{Br} 0,5 - 100 mbar

Mounting instruction - impulse lines P_L , P_F and P_{Br}

- Impulse lines should preferably be made of steel. Inside diameter $> \varnothing 4$ mm (steel tube $\varnothing 6/4$)
- For P_L other material can be used.
- Impulse lines P_L and P_{Br} are ready from factory
- Impulse lines shall be mounted in such a way that no condensate can flow back into the multibloc. This is especially important when P_F is concerned.
- Impulse lines shall be mounted in such a way that they are protected against rupture and damage.
- Impulse lines shall be as short as possible

Adjustment possibilities

Adjustment range



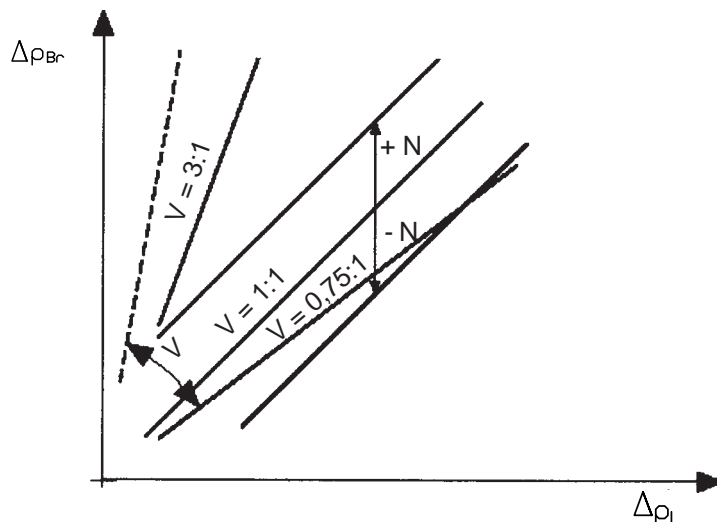
Effective burner pressure

$$\Delta P_{Br} = P_{Br} - P_F$$



Effective fan pressure

$$\Delta P_L = P_L - P_F$$



DAMPER MOTOR 2-STAGE

Air adjustment

The damper motor turns the damper between three pre-set positions: fully closed, low load, full load. These positions are controlled in the motor by cams of different colours. The black cam controls the gas valve for full load.

If the air volume needs changing: Remove the cover of the damper motor and change the position of the cams by turning them with the tools accompanying the burner.

Low load:

Adjust the operating switch to full load (II).

- * Reduce the air volume:
Turn orange cam towards 0°
- * Increase the air volume:
Turn orange cam towards 90°

Adjust the operating switch back to low load and check the air volume.

Full load

Adjust the operating switch to low load (I).

- * Reduce the air volume:
Turn red cam towards 0°
- * Increase the air volume:
Turn red cam towards 90°

If the red cam is moved, change the black cam as much.

Adjust the operating switch to low load and check that the correct air volume has been obtained.

Note!

The blue cam is the limit position for fully closed damper and it is normally not necessary to change it.

Releasing button

By pressing the button and snapping it down, the motor will be released and the damper can easily be turned. This function facilitates an exchange of damper motor.

- Solenoid valve
- High capacity (black)
- High capacity (red)
- Low capacity (orange)
- Closed damper (blue)



Releasing button
N.B. The upper position is the standard position

DAMPER MOTOR MODULATING

- Before the burner starts vent the lines to make sure that there is gas available at the multibloc
- Use an allen key size 2,5 mm for adjusting N and V
- Connect a pressure gauge for measuring P_{Br} (advisable to find out if the valves are open)
- Set the switch in position MAN.
- Set the gas pressure switch min. and air pressure switch on min. adjustment. Set the gas pressure switch max, if any, on max. adjustment.
- Start the burner, observe the pressure gauge, if no flame is established and the pressure gauge needle does not flicker, increase N. When the flame is established adjust the gas flow by means of the screw N. Use a flue gas instrument.
- Change over to max. load, press the switch "increase"
- Adjust the gas flow with V and check at the same time the combustion values.
- Go back to min. load and check the combustion value. Adjust if necessary.
- If necessary repeat the controls of the adjustment made on min. (N) and max.load(V)
- The desired gas flow on min. and max. has now been adjusted by changing the orange and the red cams. Check the gas flow on the gas meter available on the installation.

Note! Do not forget to set the air and gas pressure switches after the adjustment, see special instructions

Air adjustment

Adjust the orange cam for min. load (about 5-10 on scale)

Adjust the red cam for max. load (90°)

The blue cam is factory set for closed position during standstill

The black cam has no function at modulating operation

Releasing button

By pressing the button and snapping it down, the motor will be released and the damper can easily be turned. This function facilitates an exchange of damper motor..



GENERAL INSTRUCTIONS

Adjustment of burner

The burner is from the factory pre-set to an average value that must then be adjusted to the boiler in question. All burner adjustments must be made in accordance with boiler manufacturer's instructions. These must include the checking of flue gas temperatures, average water temperature and CO₂ or O₂ concentration.

General instructions

The installation of the gas burner must be carried out in accordance with current regulations and standards. The installers of gas burners should therefore be acquainted with all regulations and ensure that the installation complies with the requirements. The installation, mounting and adjustment should be made with the greatest care and only the correct gas should be used.

Operating instructions

The operating instructions accompanying the burner should be left in a prominent position in the boiler room.

Instructions

The user should be thoroughly instructed in the function of the gas burner and the whole installation. The supplier must instruct the user.

Inspection and maintenance

Daily inspection is advisable.

Start up

After the burner has been fitted to the boiler and the electric connection, the leakage control, the venting and the electric function test have been carried out, the burner will be ready for start-up.

However, study the sections dealing with adjustments of multi-bloc, combustion air and combustion head. Open the ball valve and switch on the main switch. If the burner starts the actual adjustment can be made.

Adjustment of burner head

The burner is equipped with an adjustment device changing the position of the brake plate in the burner head. This is used to adjust the correct pressure drop over the combustion device in order to obtain a good pulsation free combustion.

Which position to use depends on input and overpressure in the boiler. A general rule is that the lower capacity the smaller the opening between brake plate and combustion device.

Commissioning of installation

Control of the combustion. The combustion quality is checked by means of a flue gas analysis device. Adjust the burner to appr. 20% excess air in accordance with the table. Check the flue gas temperature. Calculate the efficiency. Check also the actual gas volume on the gas meter so that the correct input is achieved.

Service

Service should only be carried out by qualified personnel. Replacement parts should be of the same make and approved by the same authorities as the original. If the burner is converted to fire another gas quality it must be re-commissioned. If town gas is to be fired the combustion head must be converted and the gas train adjusted to suit (e.g. a larger gas armature or a different spring in the governor may be required).

Gas quality	CO ₂ % lambda 1,2	O ₂ %	max. CO ₂ %
Natural gas	10,0	3,5	11,9
LPG	11,5	3,5	13,9

GENERAL INSTRUCTION

Flame monitoring and measurement of ionisation current

The burner is monitored according to the ionisation principle. Check the ionisation current on start-up and on each service call.

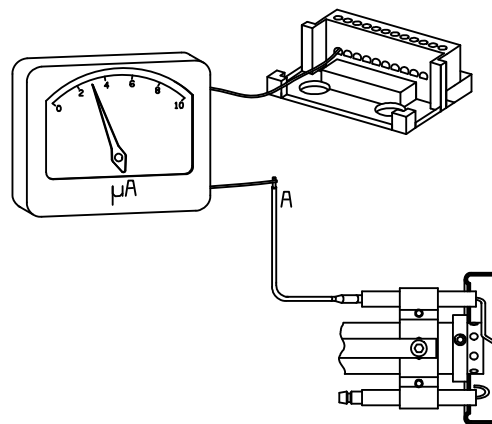
The reason for a low ionisation current may be leaking currents, bad connection to earth, dirt or a faulty position of the flame electrode in the burner head. Sometimes also a faulty gas/air mixture may cause too weak a ionisation current.

The ionisation current is measured by means of a microampere meter (μA) connected in series with the flame electrode and the gas burner control.

Connect the μA -meter, see figure. Min. required ionisation current according to table. In practice this current must be considerably higher, preferably more than $10 \mu\text{A}$. All the gas burners are equipped with a ionisation cable that can be slit which facilitates the connection of the μA -device.

Gas control	Connection to terminal in gas control	Min. ionisation current required
LMG Serie A	1	$2 \mu\text{A}$
LMG Serie B	2	$10 \mu\text{A}$
LGB	1	$10 \mu\text{A}$
LFL	24	$10 \mu\text{A}$
MMI 810	2	$5 \mu\text{A}$
TMG 740-3	1	$5 \mu\text{A}$

Flame monitoring



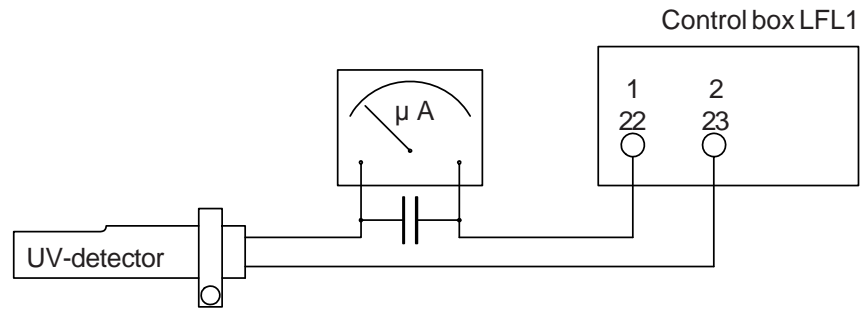
GENERAL INSTRUCTION

UV-detector

This should not be exposed to temperatures exceeding 60°C. The current passing through the UV-detector, when it is being illuminated, should be at least 70 μ A for LFL1.. This current can be measured by means of a moving coil instrument. Checks should only be made if a fault is suspected.

The capacitor, which could be placed between the terminals on the moving coil instrument, must be of 100 μ F 10-25 V.

Flame monitoring



GENERAL INSTRUCTION

Adjustment of air pressure switch

The air pressure switch should stop the burner, if the air volume is reduced. The air proving device shall be adjusted in such a way that if there is insufficient air supply at the highest or lowest burner operating stage, the device operates before the supervised pressure is less than 80% of the pressure at the controlled stage and the CO content of the combustion products exceeds 1% by volume.

On adjustment, turn the scale on the air pressure switch in clockwise direction. When the switch-off point has been reached and the burner stops read off the value on the scale. Then turn the scale in anti-clockwise direction to desired value. Make repeated start attempts to ensure that the air pressure switch is not too closely set.

Adjustment range ca:
1-10 mbar LGW 10
2,5-50 mbar LGW 50

Adjustment of min. gas pressure switch

The min. pressure switch should react if the gas pressure is too low and prevent the burner from starting. Too low a gas pressure during operation should stop the burner. The burner may start again when the rated gas pressure has been reached.

Remove the protective cover. Connect a pressure gauge for measuring the rated pressure. Decide on pressure at which the gas switch should switch off. Set this pressure by means of the valve. Carefully turn the knob (see figure) until the gas pressure switch switches off. The value shown on the scale should then approximately correspond with the value shown on the pressure gauge. Tolerance on scale appr. $\pm 15\%$. Open the ball valve.

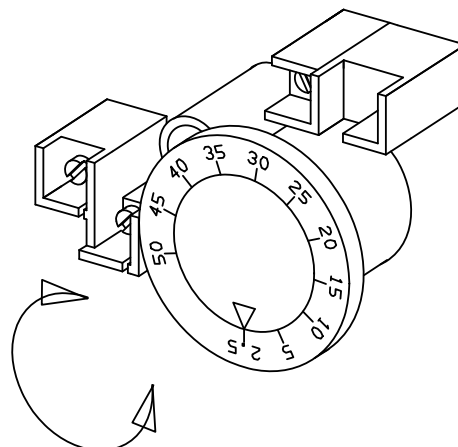
Adjustment of max. gas pressure switch

The burner is equipped with a max. gas pressure switch only on request. It should stop the burner if the gas pressure exceeds the set value. The burner can then only be re-started manually (gas burner control or overpressure switch).

Remove the protective cover. Connect a pressure gauge for measuring the rated gas pressure. Decide on pressure at which the gas pressure switch should switch off. Turn the adjustment knob to this value. Tolerance on the scale $\pm 15\%$.

Adjustment range:
2,5-50 mbar GW 50
5-150 mbar GW 150

Gas pressure switch, air pressure switch



LEAKAGE CONTROL, DUNGS VPS 504 SERIES 2

Technical data

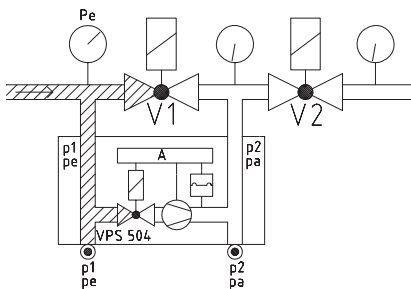
Test volume	≤ 4,0 l
Pressure increase using motor pumps	≈ 20 mbar
Backup (customer supply)	10A fast or 6.3A slow
Fuse integrated in housing, replaceable	T6,3L 250V (IEC 127-2/111) (DIN41662)
Switching capacity	Operating outputs SO1, SO2, SO4: 4A Fault output T7: 1A
Release time	Fault output SO4 1, 2, 3, T7: 1A ≈ 10 - 30 s
Sensitivity limit	Depending on test volume and input pressure. 50 l/h
Max. number of test cycles	20/h

Programme sequence

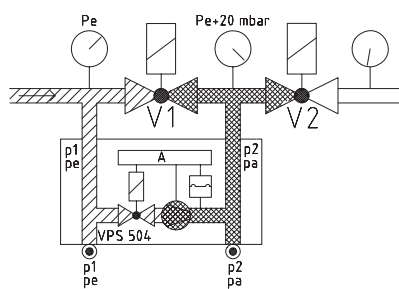
Idle state: Valves 1 and 2 are closed. Pressure build-up: The internal motor pump increases the gas pressure P_e in the section by approx. 20 mbar compared with the input pressure at valve V1. During the test time, the integrated differential pressure sensor monitors the test section for leaks. When the test pressure is attained, the motor pump switches off (end of test period). The release time (10-30 s) is depending on the test volume (max. 4.0 l). If the test section has no leaks, the contact is released to the control box after approx. 30 s and the yellow LED lights up. If the test section is leaky or if the pressure increase by + 20 mbar is not attained during the test period (max. 26 s), the VPS 504 generates a fault. The red LED is lit as long as the contact is released by the regulator (heat requirement).

After a short voltage drop during testing or during burner operation, an automatic restart is performed.

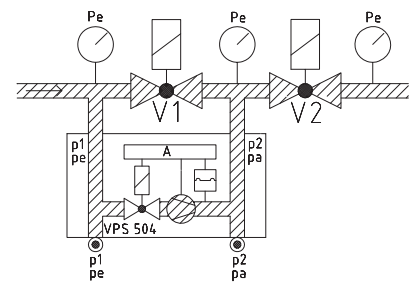
Programmer Idle state



Pressure buildup

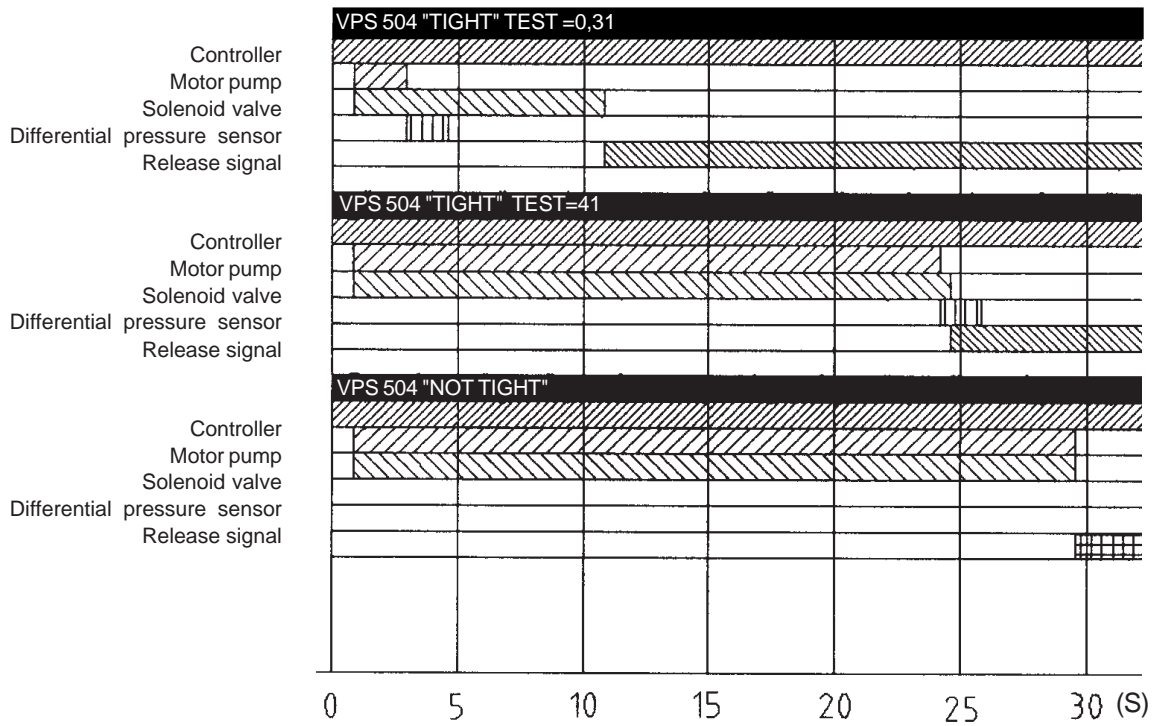


Operation



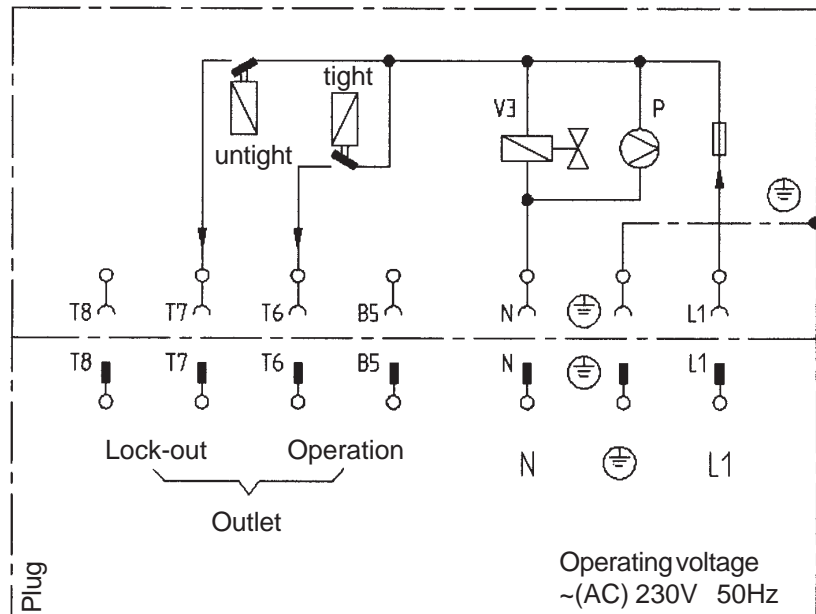
LEAKAGE CONTROL

Program sequence schedule



Electrical connection VPS 504 Series 02

The VPS 504 is connected in series between the temperature regulator and the control box via a 7-pole plug connector. See the Bentone wiring diagram.



HANDING OVER OF THE INSTALLATION

- Make repeated start attempts to ensure that the adjustments function.
- Close the ball valve during operation to check that the gas switch switches off at the set value.
- Remove the hose for the air pressure switch to check that the burner locks out.
- Check that all protective covers and measurement nipples are mounted and fastened.
- Fill out necessary test reports.
- Instruct the persons in charge of the operation on the service and maintenance of the installation and what to do should any troubles occur.
- **Inspection and service must be carried out by authorized personnel.**

Fault location, functional troubles

Trouble free operation is depending on three factors: electricity, gas and air supply. Should there be any changes in the ratio between these three factors, there is a risk of break downs. It has been proved that most break downs are caused by simple faults. Before calling the service engineer, the following should therefore be checked:

- Is the gas cock open?
- Are all fuses in order and the current switched on?
- Are the thermostats correctly set?
- Are pressostats, overheating protection etc. in operating position and not locked-out?
- Is the gas pressure sufficient?
- Is the gas burner control in start position?
- Has the gas control or the motor protector locked out? - Reset.
- Is the circulation pump in operation?
- Is there a supply of fresh air to the installation?

If integral components are of a different make from what is stated in this manual, see the enclosed sheet.

DECLARATION OF CONFORMITY

We
(supplier's name)

BENTONE

(address)

P.O. Box 309, S-341 26 Ljungby, Sverige

declare under our sole responsibility that the product
(name, type or model, batch or serial number, possible sources and number of items)

**BG 100, BG 150, BG 200, STG 120, STG 146, BG 300, BG 300LN, BG 400, BG 400LN, BG 450, BG 450LN,
BG 500, BG 500LN, BG550, BG550LN, BG 600, BG 600LN, BG650, BG 700, BG 700LN, BG 800, BG 800LN,
and BG950 all fan gas burners**

to which this declaration relates is in conformity with the following standard(s) or the normative document(s)
(title and/or number and date of issue of the standard(s) or other normative document(s))

EN 676, DIN 4788

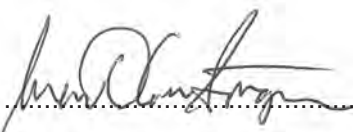
following the provisions of Directive
(if applicable)

Gas directive 90 / 396 / EEC, EMC directive 89 / 336 / EEC och Low voltage directive 73 / 23 / EEC

Ljungby, 031201

(Place and date of issue)

BENTONE
Sven-Olov Lövgren



(name and signature of equivalent marking of authorized person)

FAULT LOCATION GUIDE

Gas burner

The basis for a trouble free operation can only be ensured by the correct combined effect of the three factors: electricity, gas flow and combustion air. Should any of these factors change, troubles may arise.

It has been proved that many troubles have rather simple causes. Before calling the serviceman, the following checks should be made:

1. Are the gas cocks of the installation open?
2. Are the fuses in order and the current switched on?
3. Are the controls (room thermostat, boiler thermostat etc.) correctly adjusted?
4. Is the gas pressure to the burner sufficient?
5. Is the gas relay of the burner ready for start and not locked out?
6. Is the air supply to the burner sufficient?

To facilitate fault location we have drawn up a scheme showing the most frequent faults in a gas burner installation and the remedies.

Cause	Remedy
The burner does not start	
No gas _____	Check that all gas cocks are open.
No voltage _____	Check fuses, thermostats and electrical connections.
The burner motor fails to start _____	The thermal protection has locked out. Motor defective.
The gas relay is defective _____	Replace
Burner motor is running but no ignition after the pre-purge time has elapsed	
No voltage on the terminals _____	Check the contact. Replace faulty relay
The ignition electrodes in contact with each other or with earth _____	Adjust
The porcelain of the electrodes is broken _____	Replace the electrodes
The cable shoes have bad contact _____	Improve the contact
The ignition cables are damaged _____	Replace
The ignition transformer is damaged, no voltage on the secondary side _____	Replace the transformer
The ignition cable and the ionisation cable have been transposed. _____	Change

Cause

Remedy

No flame establishment despite a trouble free start

The gas solenoid valve defective	Replace
The gas solenoid valve does not open despite its obtaining voltage	Replace coil or the whole valve if necessary.
No voltage to the solenoid valve	Check the contact
No electrical connection through the air pressure switch	Test the adjustment and the function of the air pressure switch.
The starting load is not correctly adjusted	Reduce or increase the gas supply, reduce the quantity of air.
Gas relay defective	Replace
Air pressure switch incorrectly adjusted or defective	Check the adjustment and readjust.
No response as the cams of the servomotor are not correctly adjusted or out of position.	

The burner locks out after the safety time has elapsed in spite of flame establishment

No ionisation current or the UV-cell in wrong position	Adjust the ionisation electrode and the UV-cell, examine cables and connections.
The supervision part of the gas relay is defective	Replace the relay
Voltage lower than 185 V	Contact the electricity authorities.
The ignition electrodes are disturbing the ionisation current	Adjust the ignition electrodes, repole the ignition transformer if necessary.
Bad earthing	Arrange for proper earthing.
Phase and neutral transposed	See wiring diagram and change.

The burner locks out during pre-purge

Air pressure switch defective or incorrectly adjusted	
The starting load is not correctly adjusted	Reduce or increase the gas supply. Reduce the quantity of air.
The gas pressure is too low	Increase the pressure. Contact the gas supply company if necessary.

Condensation in boiler and chimney

The flow gas temperature is too low or the quantity of gas is not sufficient	Increase the flue gas temperature by increasing the gas supply. Insulate the chimney.
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Cause

Remedy

Pulsations at start

- | | |
|--|--|
| The ignition electrodes are wrongly adjusted | Re-adjust. |
| The gas pressure is too high | Check and adjust by means of a pressure gauge and a pressure adjustment valve. |
| The flue gas side is blocked | Check the chimney flue. |

Pulsations during operation

- | | |
|--------------------------------------|---|
| The burner is not correctly adjusted | Re-adjust |
| The burner is dirty | Clean the burner. |
| Defective chimney | Check and change the dimensions if necessary. |

The burner is operating correctly but locking out now and then

- | | |
|---|---|
| The ionisation current is too low | Check. Must be at least 4 μ A according to the relay manufacturer but should be 8-20 μ A. |
| The UV-cell is in a wrong position | Adjust. |
| Voltage drop at certain times | Must not drop more than 15% of the rated current. |
| Air pressure switch defective or incorrectly adjusted | Contact the electricity authorities if necessary. |
| Spark-over in ignition electrodes | Replace the electrodes |
| The ambient temperature of the gas relay is too high | Heat insulate, max. 60° C. |
| The ignition spark is too weak | Check the transformer |

Bad combustion

- | | |
|---|---|
| Bad draught conditions | Check the chimney |
| The flue gas temperature is too high | The boiler is overloaded. Reduce the quantity of gas. |
| The CO ₂ -content is too low | Check the boiler with regard to leaks. Choke the draught if it is too high. |

The CO-content is too high

- | | |
|--|---|
| Excess air when using natural gas and gasoil (propane, butane) | Choke the air. |
| Air shortage | Open the air supply. Check the flue gas damper. |
| The holes in the gas nozzle are clogged | Clean. |
| The fresh air intake is too small | Check and enlarge |
| The flame is not burning straight because the burner head is out of position | Check the burner head and readjust. |