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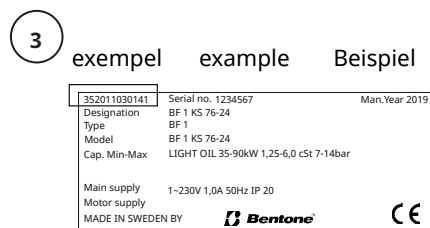
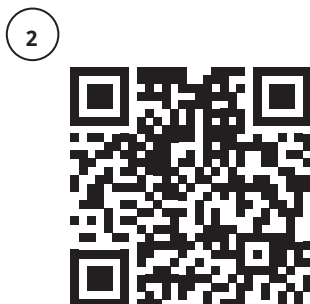
Installation- and maintenance instruction

## **BG 700 M**

BP230UVFR-S2

MB-VEF 415-425

VPS 504



## -sv

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# 1. General Information

The burner may only be used for its intended purpose in accordance with the product's technical data.

We reserve the right to make design changes and cannot be held liable for any misprints or typographical errors.

Modifying the design or using accessories or components that have not been approved by Enertech in writing is strictly prohibited.

This Installation and Maintenance manual:

- is to be regarded as part of the burner and must always be kept near the installation site.
- must be read prior to installation.
- is intended for use by authorised personnel.

## 1.1 Delivery inspection

- Make sure everything is delivered and the goods have not been damaged during transit. Transport damage should be reported to the shipping company.
- If something is wrong with a delivery, report it to the supplier.

## 1.2 Safety

### - before installation:

- Installation and work on the burner and associated system components may only be carried out by persons who have undergone relevant training.
- The product is packaged to prevent damage from occurring when handled – Handle the product with care! Lifting equipment must be used to lift larger packages.
- The products must be transported/stored on a level surface in a dry environment, max. 80% relative humidity, no condensation. Temperature -20 to +60 °C.

### - installation:

- The burner must be installed in accordance with local regulations for fire safety, electrical safety, and fuel distribution.
- The premises must comply with local regulations pertaining to use of the burner and must have adequate air supply.
- The installation site must be free of chemicals.
- Fire extinguisher with Class BE recommended.
- Make sure when installing the burner that there is enough space to service the burner.
- The electrical installation must be professionally carried out in accordance with current mains electricity regulations and in a professional manner.
- Make sure that the burner is suitable for the application (see Technical Data).
- All components must be installed without being bent, twisted or subjected to mechanical or thermal forces that affect components.





- Care must be taken by the installer to ensure that no electrical cables or fuel lines are pinched or otherwise damaged during installation or service.
- Sharp edges can occur on, for example: flame tube, fan wheel and air damper.
- The gas outlet from the pressure regulator must be configured in accordance with applicable regulations and lead to a safe area.

#### **- before first start:**

- The burner must not be put into operation without proper safety and protection devices.
- Permitted ambient temperature during operation -10 to +60 °C. Max. 80% relative humidity, no condensation.
- The surface temperature of the burner's components may exceed 60 °C.
- Handle with caution – the burner has moving parts, and there is risk of crushing injuries.
- Seal inspections must be performed during installation and servicing to prevent leakage.
- Fitting and installation work has been completed and approved.
- Electrical installation has been correctly performed.
- Flue gas ducts and combustion air ducts are not blocked.
- All actuators and control and safety devices are in working order and correctly set.
- If the boiler is equipped with an access hatch, this must be equipped with a hatch opening switch connected to the burner's safety system.
- When in operation, the burner's noise level can exceed 85 dBA – use hearing protection!

#### **- Operation:**

- Carry out all stipulated settings, service and inspection work within the set time.

### **1.3 What to do if you smell gas**

- Turn off the fuel supply.
- Turn off the device and remove the boiler from operation.
- Open windows and doors.
- Prevent open flames or sparking, e.g. do not turn lights on or off, do not use any electrical appliances or mobile phones.
- Evacuate the building.
- Notify the installer or gas supplier of the problem so that it can be rectified.



## 2. Technical data

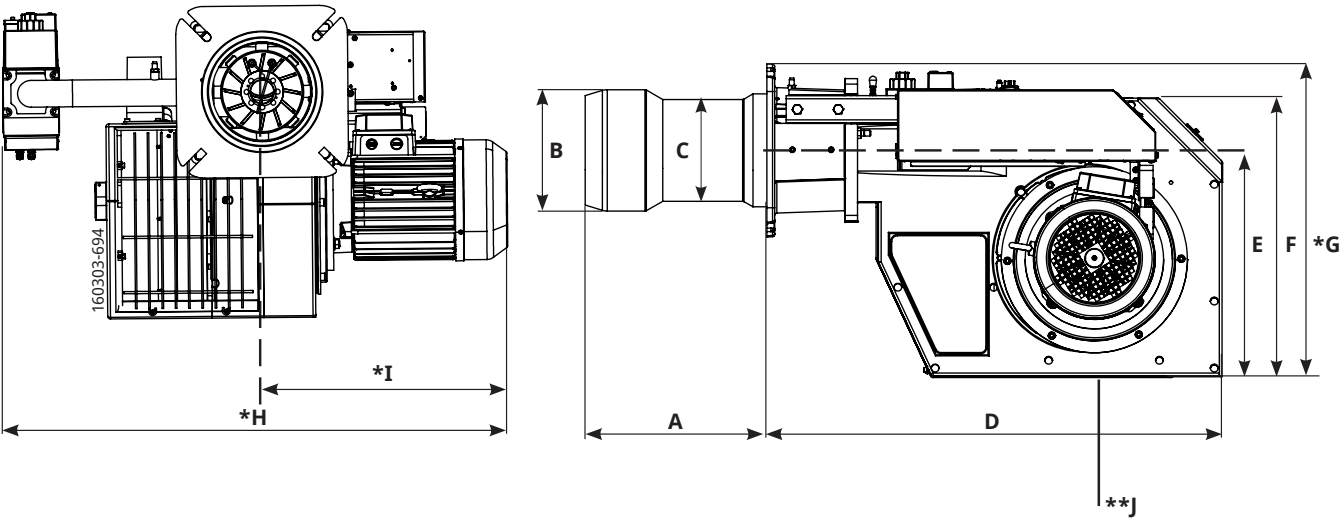
### The burner is intended for:

- Operation in installations according to EN 303 and EN 676.

### Fuels:

- Natural gas H, E, L, LL.
- LPG, Butane and Propane.

### 2.1 Dimensions BG 700 M



| Length of flame tube | Flame tube measure A | Flame tube measure B | Flame tube measure C |
|----------------------|----------------------|----------------------|----------------------|
| 363                  | 328                  | ø220                 | ø205                 |
| 663                  | 628                  | ø220                 | ø205                 |

| D   | E   | F   | G    | H    | I   | J     |
|-----|-----|-----|------|------|-----|-------|
| 820 | 410 | 510 | *730 | *970 | 420 | **200 |

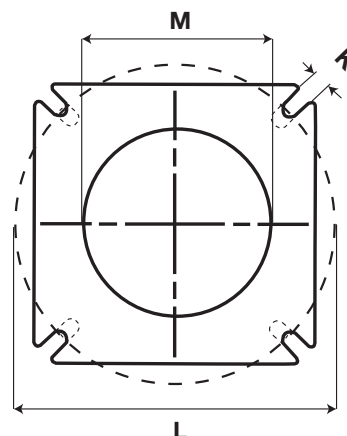
\* The above dimensions are max. measurements. Depending on the components used, the measurements may vary.

\*\* Min. recommended distance to floor.

## 2.4.1 Measurements for connection to the boiler

| K  | L                | M                 |
|----|------------------|-------------------|
| 14 | (Ø 280) Ø320-380 | *** (Ø 210) Ø 230 |

\*\*\*Dimensions when installing flame tube from the inside of the heat generator.



## 2.5 Capacity range

| Capacity<br>kW | Gas quantity at min.<br>power<br>Nm³/h | Gas quantity at max.<br>power<br>Nm³/h | Max. connection<br>pressure<br>mbar | Nominal<br>connection<br>pressure mbar |
|----------------|----------------------------------------|----------------------------------------|-------------------------------------|----------------------------------------|
| <b>BG 700</b>  |                                        |                                        |                                     |                                        |
| G20 300 - 1500 | 31.7                                   | 158.7                                  | 360                                 | See data plate.                        |
| G25 300 - 1500 | 36.9                                   | 184.5                                  | 360                                 |                                        |
| G31 380 - 1650 | 15.5                                   | 67.5                                   | 360                                 |                                        |

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Gas quantity and capacity vary according to grade of gas and connection pressure.

## 2.2 Gas categories, approved gases

Only dry gas is permitted for use.

| Category             | Country of destination                                                                                                                 | Supply pressure |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| II <sub>2R3R</sub>   | AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, TR | 40 mbar         |
| II <sub>2H3B/P</sub> | AT, CH, CY, DK, FI, LT, RO, SE, SK                                                                                                     | 40 mbar         |
| II <sub>2H3P</sub>   | GB, IE                                                                                                                                 | 40 mbar         |
| II <sub>2L3B/P</sub> | NL, RO                                                                                                                                 | 40 mbar         |
| II <sub>2E3B/P</sub> | PL                                                                                                                                     | 40 mbar         |
| I <sub>2E(R)B</sub>  | BE                                                                                                                                     | 40 mbar         |
| I <sub>3P</sub>      | BE                                                                                                                                     | 40 mbar         |

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## 2.3 Technical specification

| BG 700 M                                |                            |
|-----------------------------------------|----------------------------|
| Main supply, Operation <sup>1) 2)</sup> | 230V, 1~, 1.6A, 50Hz, IP20 |
| Main supply, Motor <sup>1)</sup>        | 230/400V, 10.4/6.0A        |
| Max fuse rating, Motor                  | 6.3A                       |
| Max fuse rating, Operating              | C10A                       |
| NO <sub>x</sub> -class                  | 2                          |
| Noise level                             | 93 dBA                     |

<sup>1)</sup> Max operating current, see data plate.

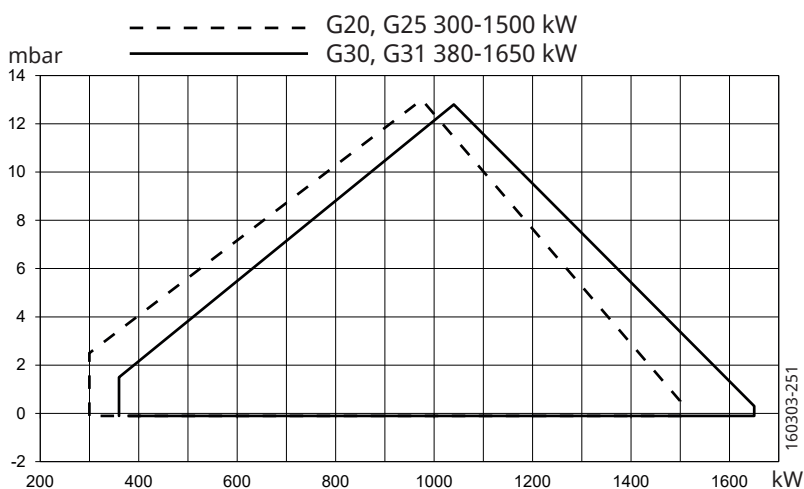
<sup>2)</sup> Motor excluded.

Measurements according to EN 15036-1:2006

Alt.1 The noise level of the burner can be reduced by equipping the burner with silencer. Installation must be done so it does not prevent air supply to the burner.

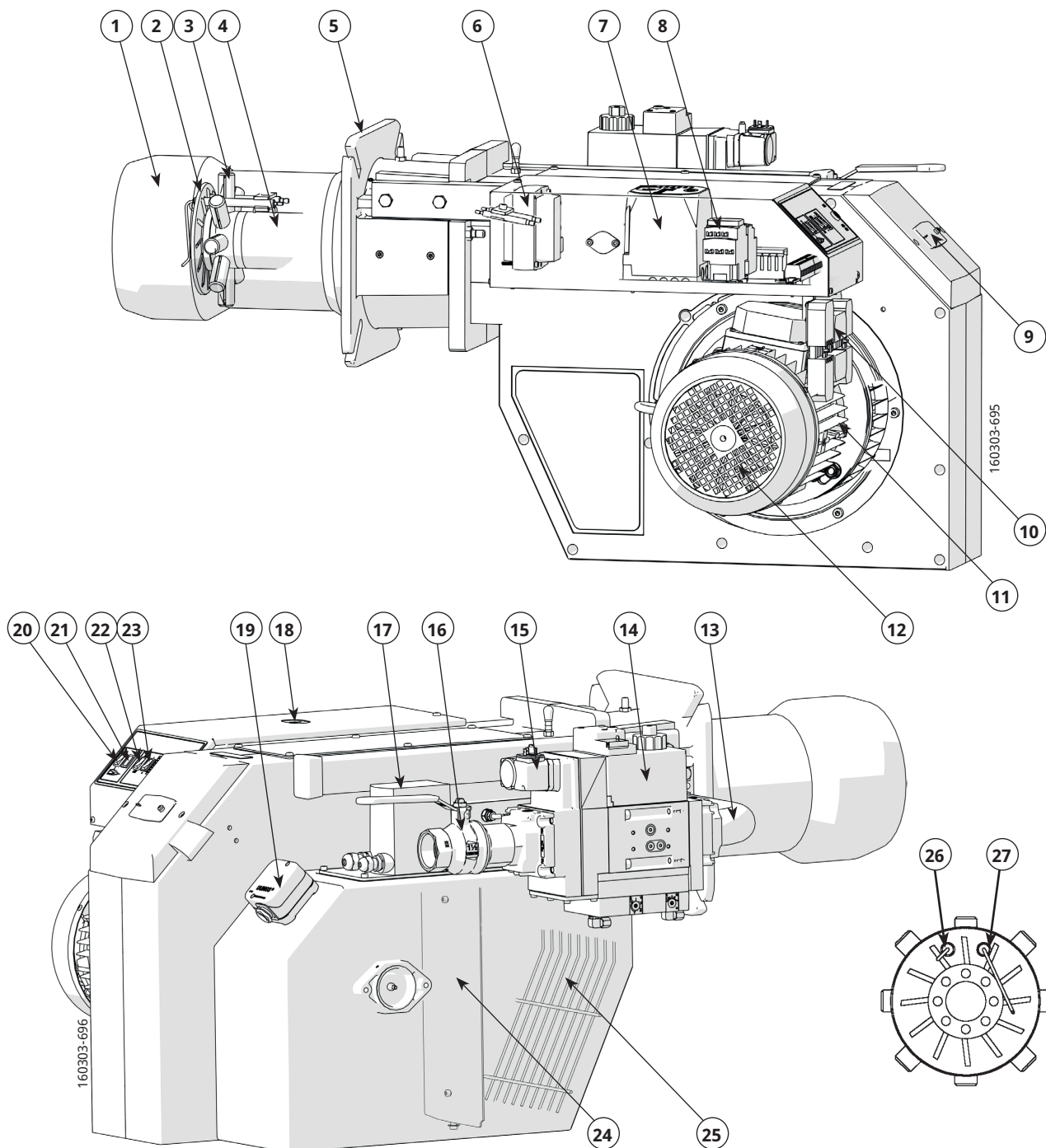
Alt.2 The burner's noise level can be reduced by connecting the burner's air intake to the air duct that opens into an appropriate location. Installation must be done so it does not prevent air supply to the burner.

## 2.4 Working field



Do not exceed working field.

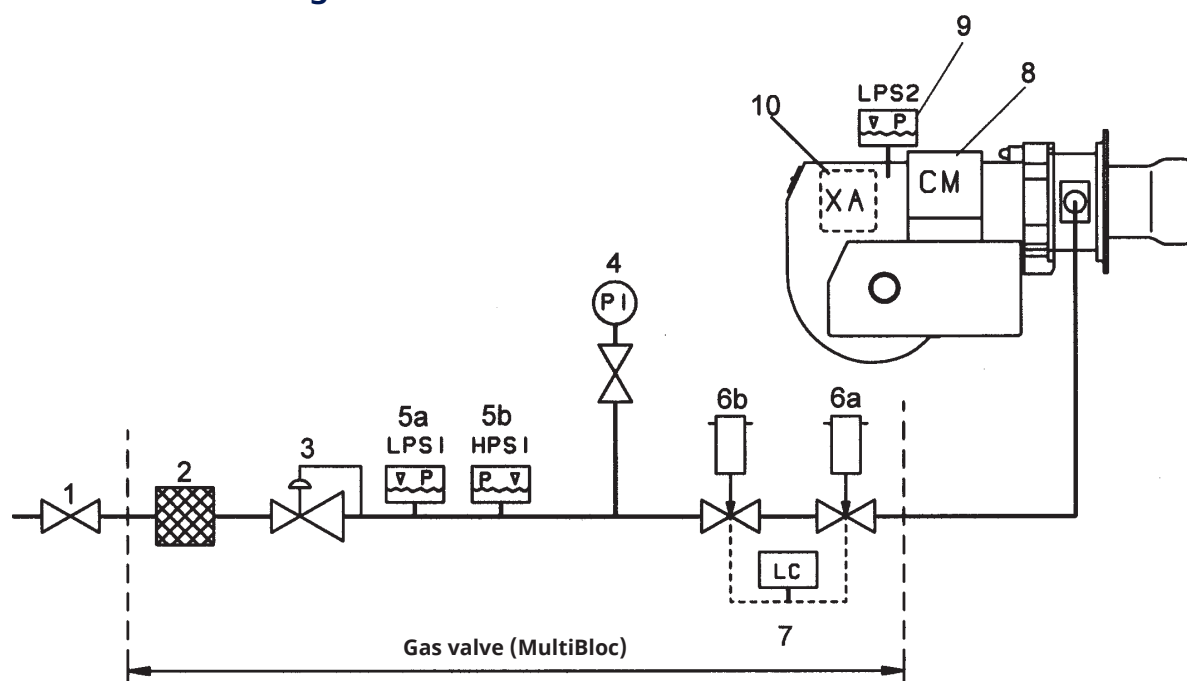
## 2.6 Components



- |                                    |                              |                                           |
|------------------------------------|------------------------------|-------------------------------------------|
| 1. Flame tube                      | 10. Electrical connection    | 20. Power switch 0-I                      |
| 2. Brake plate                     | 11. Fan wheel                | 21. Indication lamp, operation            |
| 3. Nozzle                          | 12. Motor                    | 22. Change-over switch, man-auto          |
| 4. Inner assembly                  | 13. Connection, gas          | 23. Change-over switch, increase-decrease |
| 5. Fixing flange                   | 14. Gas valve (MultiBloc)    | 24. Air damper                            |
| 6. Transformer                     | 15. Gas pressure switch, min | 25. Air intake                            |
| 7. Burner Control                  | 16. Ball valve               | 26. Ignition electrode                    |
| 8. Contactor + Overload protection | 17. Damper motor             | 27. Ionisation electrode                  |
| 9. Cover, inspection glass         | 18. Reset button             |                                           |
|                                    | 19. Air pressure switch      |                                           |



## 2.7 Skeleton diagrams



1. Ball valve
2. Filter
3. Pressure regulator
4. Pressure gauge with shut-off cock
- 5a. Gas pressure switch, min
- 5b. Gas pressure switch, max
- 6a. Main valve, 2-stage. In modulating operation, this valve is equipped with controls for variable opening.
- 6b. Safety valve
- 7.<sup>1)</sup> Leakage control
9. Air pressure switch
10. Gas burner control

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

<sup>1)</sup> Required over 1200 kW according to EN 676.

## 3. Electric equipment

### 3.1 Safety system

The safety system (safety switch for hatches, doors, water level, pressure, temperature and other safety devices) must be installed in the safety circuit in accordance with current regulations for the system.

The cables of the safety system must be separated so that the outgoing signal is not placed in the same cable as the incoming signal.

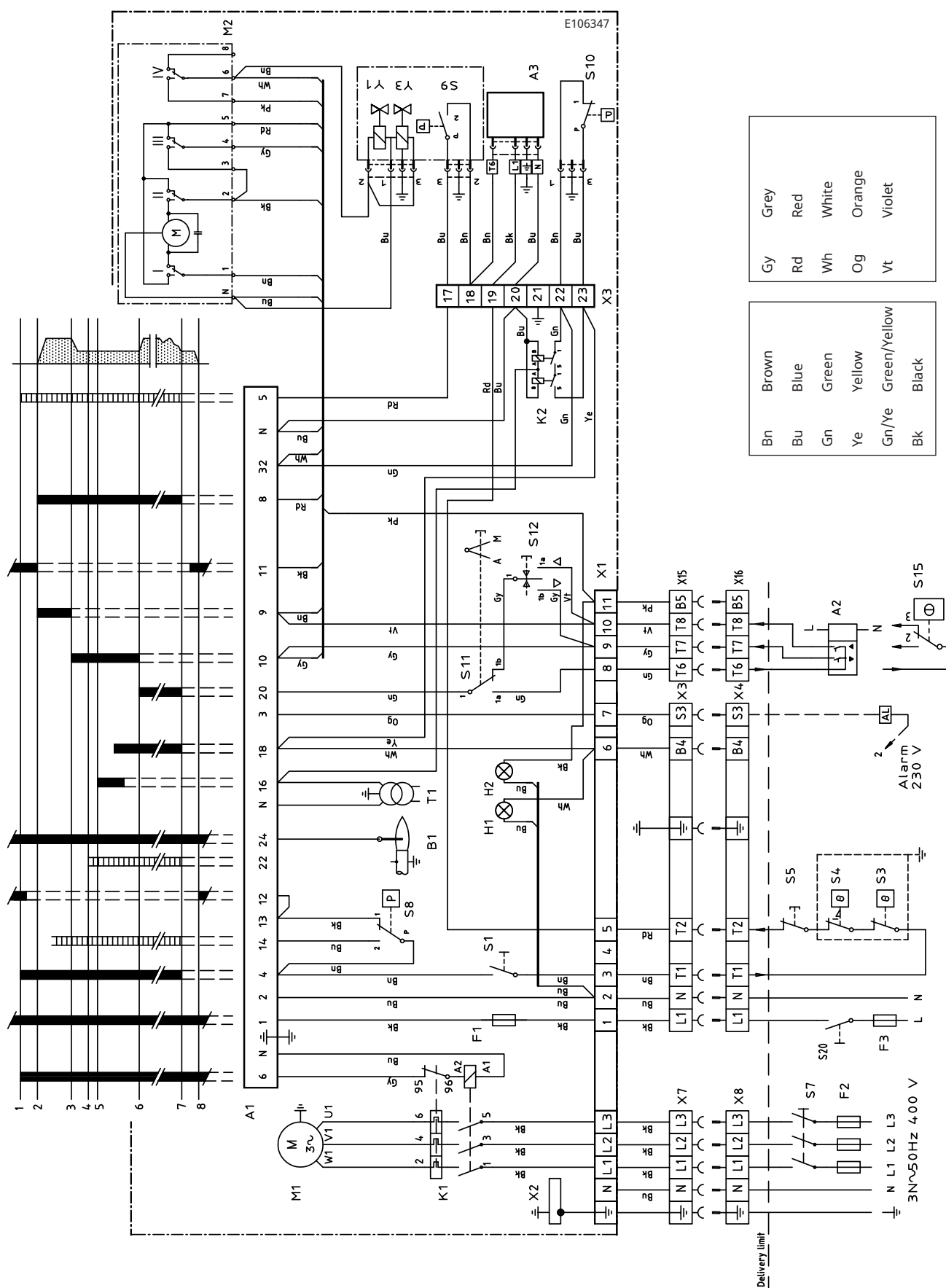


**Mains connection and fuse in accordance with local regulations.**

### 3.2 Components

|    |                                         |     |                                                       |
|----|-----------------------------------------|-----|-------------------------------------------------------|
| A1 | Burner control                          | S8  | Air pressure switch                                   |
| A2 | Multi-stage thermostat                  | S9  | Gas pressure switch, min                              |
| A3 | Leakage control, VPS504                 | S10 | Gas pressure switch, max./manual reset                |
| B1 | Ionisation electrode                    | S11 | Change-over switch, Man-Auto                          |
| F1 | Fuse                                    | S12 | Change-over switch, Increase-Decrease                 |
| F2 | Fuse                                    | S15 | Control thermostat, 3-pole (only for 2-stage sliding) |
| F3 | Fuse                                    | S20 | Main switch operating power                           |
| H1 | Indicator lamp, Stage 1/ Operating lamp | T1  | Ignition transformer                                  |
| H2 | Indicator lamp, Stage 2                 | X1  | Connection block                                      |
| K1 | Contactor + Overload protection         | X2  | Earth terminal                                        |
| K2 | Auxiliary relay                         | X3  | Plug-in contact, burner                               |
| M1 | Motor                                   | X4  | Plug-in contact, boiler                               |
| M2 | Damper motor                            | X7  | Plug-in contact, 3-phase, burner                      |
| S1 | Operating switch                        | X8  | Plug-in contact, 3-phase, boiler                      |
| S3 | Regulating/Operating thermostat         | X15 | Plug-in contact, power controller, burner             |
| S4 | Temperature/Pressure limiter            | X16 | Plug-in contact, power controller                     |
| S5 | Safety switch                           | Y1  | Solenoid valve 1                                      |
| S7 | Main switch                             | Y3  | Solenoid valve 3                                      |

### 3.3 Wiring diagram



## 4. Control

|                                 | BP230UVFR-S2  | BP230UVFR-S3  | BP230UVFR-S4  |
|---------------------------------|---------------|---------------|---------------|
| Pre-purge time (t1)             | 30.7 s        | 37.2 s        | 60 s          |
| Pre-ignition time (t3)          | 6 s           | 2.5 s         | 2.5 s         |
| Safety time (TSA)               | 3 s           | 5 s           | 5 s           |
| Post-purge time (t6)            | 16.8 s        | 14.9 s        | 15 s          |
| Reaction time for low interrupt | 1 s           | 1 s           | 1 s           |
| Ambient temperature BP          | -40 to +60 °C | -40 to +60 °C | -40 to +60 °C |
| Ambient temperature UV5         | -20 to +60 °C | -20 to +60 °C | -20 to +60 °C |
| Max. current, terminals 6-7     | 2 A           | 2 A           | 2 A           |
| Max. current, other terminals   | 1 A           | 1 A           | 1 A           |
| Ionisation current              | 3-10 µA       | 3-10 µA       | 3-10 µA       |

### 4.1 Technical data

### 4.2 LED indicator lamps

BurnerPRO's burner control has seven LEDs which indicate the operating status of the control unit and the cause of the lockouts.

Each LED has an icon describing its function.

|                                                                                     |                   |                                                                                                                                                         |
|-------------------------------------------------------------------------------------|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | FAN               | Lights up when voltage is supplied to the fan motor (terminal 6)                                                                                        |
|  | OPEN DAMPER<br>6  | Flashes when the damper motor runs to maximum position. When the switch for the maximum damper motor position closes, this LED will light continuously. |
|  | CLOSE DAMPER<br>5 | Flashes when the damper motor runs to minimum position. When the switch for the minimum damper motor position closes, this LED will light continuously. |
|  | AUTO<br>4         | Lights up when the Burner control is in normal operating mode.                                                                                          |
|  | IGNITION<br>3     | Indicates ignition                                                                                                                                      |
|  | FLAME<br>2        | Lights up when a flame is detected by the flame detector.                                                                                               |
|  | ALARM/STATUS      | In lockout mode, the Alarm lamp lights up and the other LEDs light up to indicate lockout. Refer to "Fault codes".                                      |

The LEDs can show the flame strength in Control mode by pressing the reset button for 3 seconds when the Flame LED flashes during start-up. In Control mode, the Status LED shines yellow, the Fan LED flashes, and LEDs 2-6 show the flame signal strength. Each LED corresponds to 20% of the total flame signal. 5 lit LEDs correspond to 100% and 2 LEDs correspond to 40%.

## 4.3 Explanation of the different sequence modes

1. **Operation**  
This is the control unit voltage supply.
2. **System test**  
In this status mode, the control unit undergoes an internal test to verify correct functionality of the hardware and software.
3. **Preconditions for burner start-up**  
The control unit verifies that the air pressure switch is in the depressurised position and a test of the fuel cut-off valve is carried out.
4. **Heating requirement**  
The operating thermostat closes and voltage is supplied to connection 5 so that the control unit can start the burner.
5. **Pre-purge begins**  
The control unit starts the fan. Connections 6 and 7.
6. **Damper motor opens**  
Control unit connection 9 sends a command to the damper motor to run at Max. mode. The control unit detects that the damper motor's end position switch indicates successful transition to the Max. load mode by supplying voltage to the connection 8 input. The control unit also performs a test to ensure that the air sensor detects airflow by monitoring connection 14.
7. **Pre-purge**  
The combustion chamber is ventilated.
8. **Damper motor closes**  
Following pre-purge, the control unit closes connection 10. The control unit detects that the damper motor is in the Low Load mode by supplying voltage to connection 8 on the control unit.
9. **Ignition on**  
The control unit supplies voltage to the ignition transformer by activating connection 16.
10. **Fuel on** The control unit activates the fuel valve by supplying voltage to connections 17 and 18 as well as to direct ignition systems.
11. **Flame indication**  
Ignition transformer turns off. The flame signal is tested during this stage. If no flame is detected, the burner enters Lockout mode.
12. **Operating mode**  
Once a flame is stable, the control unit transitions to Operating mode. There must be a flame signal. Voltage is supplied to connection 20.
13. **Shutdown**  
Shutdown occurs when the heating requirement is met and power is cut off to the operating thermostat connection 5 . The control unit closes the fuel valves by cutting off power to outputs 18 and 20. The fan post-purges the combustion chamber.
14. **Lockout**  
The control unit enters lockout mode when an internal or external fault is detected. The reset button and the remote-reset connection can be used to disable Lock mode. However, the control unit will revert to lockout mode if the fault is not rectified.

### Burner Lockout

When lockout occurs, the LEDs indicate the cause. The control unit status is saved in the memory, even in the event of a power outage. By pressing the manual reset button on the control unit or remote reset.



Note! At remote reset: maximum 5 reset attempts within a 15 min period, after which qualified personnel must examine the burner before further reset attempts are made.

## 4.4 BurnerPro LED fault/lock code table

| NO. | FAULT                            | LED 1                                                                               | LED 2                                                                               | LED 3                                                                               | LED 4                                                                               | LED 5                                                                               | LED 6                                                                               | LED 7                                                                              | POSSIBLE SOLUTION                                                                                                                                                                                             |
|-----|----------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|     | OPERATION LED ● = ON             | Fan                                                                                 | Open damper                                                                         | Closed damper                                                                       | Auto                                                                                | Ignition                                                                            | Flame                                                                               | Status                                                                             |                                                                                                                                                                                                               |
|     | ICON                             |  |  |  |  |  |  |  |                                                                                                                                                                                                               |
| 1   | DIAGNOSTIC ERROR, MAIN MCU INLET | ●                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | RED                                                                                | Initial diagnostic error. Ensure correct status of inputs and outputs when the unit is turned on.                                                                                                             |
| 2   | LOCAL RESET                      |                                                                                     | ●                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     | RED                                                                                | User-initiated manual reset/lockout or defective reset switch.                                                                                                                                                |
| 3   | AIR SENSOR                       | ●                                                                                   | ●                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     | RED                                                                                | Air sensor signal [connection 14] could not be detected by the end of the safety time, or loss of the air sensor signal during burner operation                                                               |
| 4   | DIAGNOSTIC ERROR                 |                                                                                     |                                                                                     | ●                                                                                   |                                                                                     |                                                                                     |                                                                                     | RED                                                                                | "The system detected voltage at terminal 16, 17, 18, or 19 at the incorrect time, or no voltage detected when necessary. Check cabling and makes sure the system is running on a single line phase (50/60Hz)" |
| 5   | IONISATION FLAME LOSS            | ●                                                                                   |                                                                                     | ●                                                                                   |                                                                                     |                                                                                     |                                                                                     | RED                                                                                | Flame loss. Inspect the system, check the gas pressure, flame detector, cabling, etc.                                                                                                                         |
| 6   | IONISATION CIRCUIT FAULT         |                                                                                     | ●                                                                                   | ●                                                                                   |                                                                                     |                                                                                     |                                                                                     | RED                                                                                | Replace the control unit. Contact reseller/distributor.                                                                                                                                                       |
| 7   | INTERNAL COMMUNICATION ERROR     | ●                                                                                   | ●                                                                                   | ●                                                                                   |                                                                                     |                                                                                     |                                                                                     | RED                                                                                | Reset the system to continue normal operation. Contact reseller/distributor if the fault persists.                                                                                                            |
| 8   | REMOTE RESET                     |                                                                                     |                                                                                     |                                                                                     | ●                                                                                   |                                                                                     |                                                                                     | RED                                                                                | The user has pressed Remote Reset or the remote controller has short-circuited.                                                                                                                               |
| 9   | IONISATION FAULT                 | ●                                                                                   |                                                                                     |                                                                                     | ●                                                                                   |                                                                                     |                                                                                     | RED                                                                                | Replace the control unit. Contact reseller/distributor.                                                                                                                                                       |
| 10  | MAIN PROGRAM SEQUENCE ERROR      |                                                                                     | ●                                                                                   |                                                                                     | ●                                                                                   |                                                                                     |                                                                                     | RED                                                                                | Replace the control unit. Contact reseller/distributor.                                                                                                                                                       |
| 11  | RAM TEST                         | ●                                                                                   | ●                                                                                   |                                                                                     | ●                                                                                   |                                                                                     |                                                                                     | RED                                                                                | Replace the control unit. Contact reseller/distributor.                                                                                                                                                       |
| 12  | PROGRAM SEQUENCE ERROR           |                                                                                     |                                                                                     | ●                                                                                   | ●                                                                                   |                                                                                     |                                                                                     | RED                                                                                | Replace the control unit. Contact reseller/distributor.                                                                                                                                                       |
| 13  | READING ERROR INPUT              | ●                                                                                   |                                                                                     | ●                                                                                   | ●                                                                                   |                                                                                     |                                                                                     | RED                                                                                | Check cabling and makes sure the system is running on a single phase (50/60Hz)                                                                                                                                |
| 14  | TIMER2 ERROR                     |                                                                                     | ●                                                                                   | ●                                                                                   | ●                                                                                   |                                                                                     |                                                                                     | RED                                                                                | Replace the control unit. Contact reseller/distributor.                                                                                                                                                       |
| 15  | CPU TEST FAILED                  | ●                                                                                   | ●                                                                                   | ●                                                                                   | ●                                                                                   |                                                                                     |                                                                                     | RED                                                                                | Replace the control unit. Contact reseller/distributor.                                                                                                                                                       |

| NO. | FAULT                                | LED 1 | LED 2 | LED 3 | LED 4 | LED 5 | LED 6 | LED 7 | POSSIBLE SOLUTION                                                                                                                                                                                      |
|-----|--------------------------------------|-------|-------|-------|-------|-------|-------|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 16  | FLAME LOSS                           | ●     |       |       |       | ●     |       | RED   | Visually inspect the flame detector and confirm that the pilot light was lit during start-up. Check the fuel supply system.                                                                            |
| 17  | CABLE FAULT                          |       | ●     |       |       | ●     |       | RED   | The system detected voltage at terminal 16, 17, 18, or 19 at the incorrect time, or no voltage detected when necessary. Check cabling and makes sure the system is running on a single phase (50/60Hz) |
| 18  | SAFETY RELAY FAULT                   | ●     | ●     |       |       | ●     |       | RED   | Replace the control unit. Contact reseller/distributor                                                                                                                                                 |
| 19  | FUEL VALVE OPEN                      |       |       | ●     |       | ●     |       | RED   | Check fuel valve cabling. The valves may not be fully closed.                                                                                                                                          |
| 20  | FLAME LOSS                           | ●     |       | ●     |       | ●     |       | RED   | Visually inspect the flame detector and confirm that the main flame was lit during start-up. Check the fuel supply system.                                                                             |
| 21  | WELDED SAFETY RELAY                  |       | ●     | ●     |       | ●     |       | RED   | Replace the control unit. Contact reseller/distributor.                                                                                                                                                |
| 22  | SELF TEST                            | ●     | ●     | ●     |       | ●     |       | RED   | Replace the control unit. Contact reseller/distributor.                                                                                                                                                |
| 23  | ROM ERROR                            |       |       |       | ●     | ●     |       | RED   | Replace the control unit. Contact reseller/distributor.                                                                                                                                                |
| 24  | FLAME LOSS DURING OPERATION          | ●     |       |       | ●     | ●     |       | RED   | Check the cabling. Check the flame detector. Check the fuel supply system.                                                                                                                             |
| 25  | RAM ERROR                            |       | ●     |       | ●     | ●     |       | RED   | Replace the control unit. Contact reseller/distributor.                                                                                                                                                |
| 26  | INTERNAL FAULT                       | ●     | ●     |       | ●     | ●     |       | RED   | Replace the control unit. Contact reseller/distributor.                                                                                                                                                |
| 27  | NOT USED                             |       |       |       |       |       |       |       |                                                                                                                                                                                                        |
| 28  | NOT USED                             |       |       |       |       |       |       |       |                                                                                                                                                                                                        |
| 29  | AMBIENT TEMPERATURE                  |       | ●     | ●     | ●     | ●     |       | RED   | Ambient temperature below -40 °C or above 70 °C                                                                                                                                                        |
| 30  | ROM ERROR                            | ●     | ●     | ●     | ●     | ●     |       | RED   | Replace the control unit. Contact reseller/distributor.                                                                                                                                                |
| 31  | IONISATION SHORT-CIRCUIT             |       |       |       |       |       | ●     | RED   | Possible external short-circuit between terminals 23 and 24. Contact reseller/distributor if the fault persists.                                                                                       |
| 32  | TIME LIMIT EXCEEDED FOR CONTROL MODE | ●     |       |       |       |       | ●     | RED   | 30-minute activation time passed.                                                                                                                                                                      |
| 33  | STANDBY FALSE FLAME                  |       | ●     |       |       |       |       | RED   | False flame detected in Standby mode.                                                                                                                                                                  |
| 34  | NOT USED                             |       |       |       |       |       |       | RED   |                                                                                                                                                                                                        |
| 35  | INTERNAL RESET                       |       |       | ●     |       |       | ●     | RED   | Internal software reset of control unit. Contact reseller/distributor if the fault persists.                                                                                                           |



| NO. | FAULT                                | LED 1 | LED 2 | LED 3 | LED 4 | LED 5 | LED 6 | LED 7 | POSSIBLE SOLUTION                                                                                                                                 |
|-----|--------------------------------------|-------|-------|-------|-------|-------|-------|-------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| 36  | SOFTWARE RESET                       | ●     |       | ●     |       |       | ●     | RED   | Internal software reset of control unit. Contact reseller/distributor if the fault persists.                                                      |
| 37  | WAITING TIME INPUTS                  |       | ●     | ●     |       |       | ●     | RED   | The system was unable to perform airflow sensor test and/or valve closure test. Check the cabling. Check the air sensor and/or fuel valve switch. |
| 38  | INTERNAL RESET                       | ●     | ●     | ●     |       |       | ●     | RED   | Internal software reset of control unit. Contact reseller/distributor if the fault persists.                                                      |
| 39  | SOFTWARE RESET                       |       |       |       | ●     |       | ●     | RED   | Internal software reset of control unit. Contact reseller/distributor if the fault persists.                                                      |
| 40  | HARDWARE RESET                       | ●     |       |       | ●     |       | ●     | RED   | Replace the control unit. Contact reseller/distributor if the fault persists.                                                                     |
| 41  | HARDWARE RESET                       |       | ●     |       | ●     |       | ●     | RED   | Replace the control unit. Contact reseller/distributor if the fault persists.                                                                     |
| 42  | CONTROL PROGRAM FROZEN               | ●     | ●     |       | ●     |       | ●     | RED   | Replace the control unit. Contact the distributor/factory.                                                                                        |
| 43  | CONTROL PROGRAM FROZEN               |       |       | ●     | ●     |       | ●     | RED   | Replace the control unit. Contact reseller/distributor.                                                                                           |
| 44  | TIMER2 ERROR                         | ●     |       | ●     | ●     |       | ●     | RED   | Replace the control unit. Contact reseller/distributor.                                                                                           |
| 45  | LOW VOLTAGE ERROR                    |       | ●     | ●     | ●     |       | ●     | RED   | Check mains power. Contact reseller/distributor if the fault persists.                                                                            |
| 46  | LOW VOLTAGE ERROR                    | ●     | ●     | ●     | ●     |       | ●     | RED   | Check mains power. Contact reseller/distributor if the fault persists.                                                                            |
| 47  | UV DETECTION FAULTY                  |       |       |       |       | ●     | ●     | RED   | Replace the control unit. Contact reseller/distributor.                                                                                           |
| 48  | INTERNAL FAULT                       | ●     |       |       |       | ●     | ●     | RED   | Replace the control unit. Contact reseller/distributor.                                                                                           |
| 49  | INTERNAL FAULT                       |       | ●     |       |       | ●     | ●     | RED   | Replace the control unit. Contact reseller/distributor.                                                                                           |
| 50  | IGNITION FEEDBACK                    | ●     | ●     |       |       | ●     | ●     | RED   | The system detected voltage at terminal 16 at the incorrect time, or no voltage. Check cabling and ensure sufficient earthing.                    |
| 51  | PILOT FEEDBACK                       |       |       | ●     |       | ●     | ●     | RED   | The system detected voltage at terminal 17 at the incorrect time, or no voltage. Check cabling and ensure sufficient earthing.                    |
| 52  | MAINP FEEDBACK                       | ●     |       | ●     |       | ●     | ●     | RED   | The system detected voltage at terminal 19 at the incorrect time, or no voltage. Check cabling and ensure sufficient earthing.                    |
| 53  | WAITING TIME FEEDBACK LIMIT EXCEEDED |       | ●     | ●     |       | ●     | ●     | RED   | Loss of feedback from the damper motor for more than 10 minutes. Check the cabling. Check the damper motor.                                       |
| 54  | MAIND FEEDBACK                       | ●     | ●     | ●     |       | ●     | ●     | RED   | The system detected voltage at terminal 18 at the incorrect time, or no voltage. Check cabling and ensure sufficient earthing.                    |
| 55  | DIAGNOSTICS INTERRUPTED              |       |       |       | ●     | ●     | ●     | RED   | Replace the control unit. Contact reseller/distributor.                                                                                           |

| NO. | FAULT                       | LED 1 | LED 2 | LED 3 | LED 4 | LED 5 | LED 6 | LED 7 | POSSIBLE SOLUTION                                                                                                             |
|-----|-----------------------------|-------|-------|-------|-------|-------|-------|-------|-------------------------------------------------------------------------------------------------------------------------------|
| 56  | UV FALSE FLAME              |       |       | ●     | ●     | ●     | ●     | RED   | False flame detected prior to ignition. Check the cabling. Check the flame detector. Ensure sufficient earthing.              |
| 57  | IONISATION FALSE FLAME      |       |       | ●     | ●     | ●     | ●     | RED   | False flame detected prior to ignition. Check the cabling. Check the flame detector. Ensure sufficient earthing.              |
| 58  | OPEN FEEDBACK READING       |       | ●     | ●     | ●     | ●     | ●     | RED   | The system detected voltage at terminal 8 at the incorrect time, or no voltage. Check cabling and ensure sufficient earthing. |
| 59  | ADJACENT POLE SHORT-CIRCUIT | ●     |       |       | ●     | ●     | ●     | RED   | Replace the control unit. Contact reseller/distributor.                                                                       |
| 60  | LOCAL RESET                 | ●     | ●     | ●     | ●     | ●     | ●     | RED   | The local reset button has been pressed in for more than 10 seconds, or the reset button is stuck.                            |
| 61  | FUEL VALVE OPEN             |       | ●     |       | ●     | ●     | ●     | RED   | Fuel valve open at incorrect time.                                                                                            |
| 62  | STRONG UV FLAME             | ●     | ●     |       | ●     | ●     | ●     | RED   | Flame detector too close to the flame. Increase the distance between the flame detector and the flame.                        |
| 63  | INTERNAL FAULT              |       |       |       |       | ●     |       | RED   | Replace the control unit. Contact reseller/distributor.                                                                       |

## 8. Installation

### 8.1 General instructions

Installation must be carried out in accordance with current regulations and instructions.

The supplier/installer of the facility is obliged to familiarize himself with all regulations so that the installation meets the requirements of the local authorities.

Installation, assembly and settings must be performed to obtain the best possible function. Only gas intended for the gas burner may be used.

### 8.2 Instructions

It is the installer's responsibility to instruct the user in detail in the functions of the gas burner and the entire system.

### 8.3 Inspection and maintenance

The system must be maintained at the interval specified in the service schedule. If the burner is in a dirty environment, service should be done at more frequent intervals.

### 8.4 Preparation for assembly

Check that the burner's dimensions and capacity range match the current boiler. The power information on the type plate refers to the burner model's min. and max. effect.

### 8.5 Gas supply

In order to obtain good operational safety, it is important that the installation of the gas distribution system is carried out correctly, considering the following:

- Check that the burner is approved for the gas quality of the installation.
- Check that the burner gas components are approved for the specified gas pressure, see type plate.
- Installation must be carried out in accordance with current standards.
- Pipe lines should be assembled so that service can easily be performed on the boiler and burner.
- Pipe lines should be assembled so that any contaminants do not come into contact with the gas components.

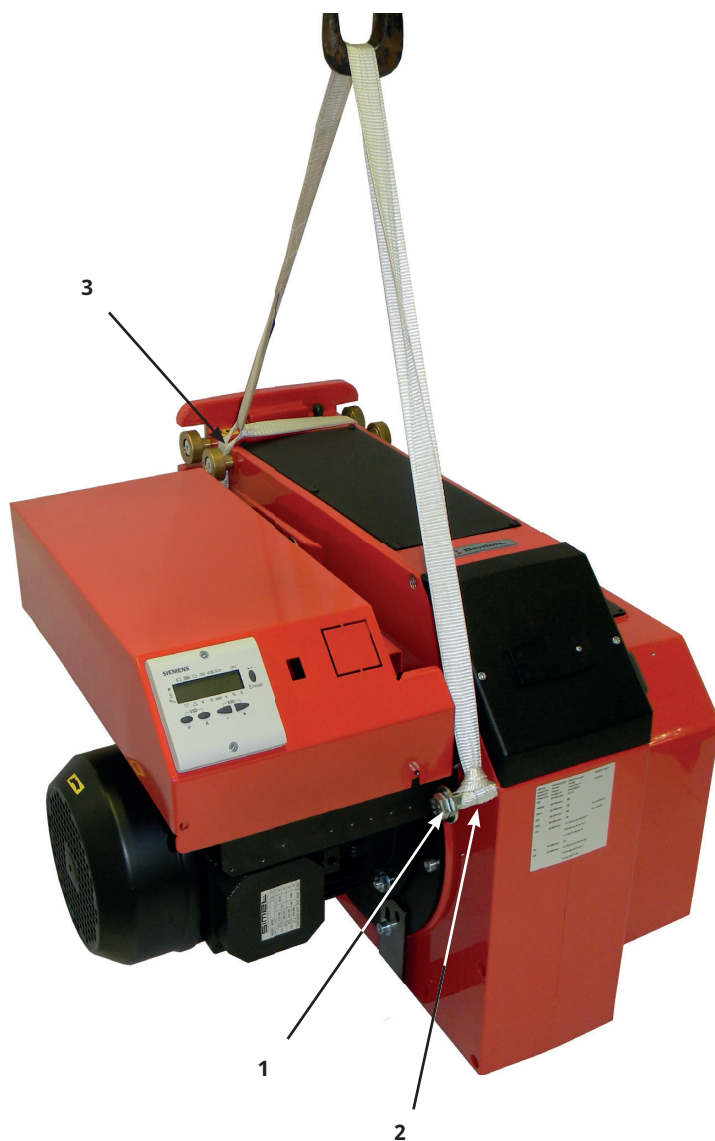
### 8.6 Electric connection

- Before work on the electrical connection, the current must be disconnected so that the installation is isolated.
- Connection must be done in accordance with the applicable regulations.
- Connection must conform to the wiring diagram.



If any electrical connection other than that recommended by Enertech is used, there is a risk of property damage and personal injury.

## 8.7 Handling and lifting instruction



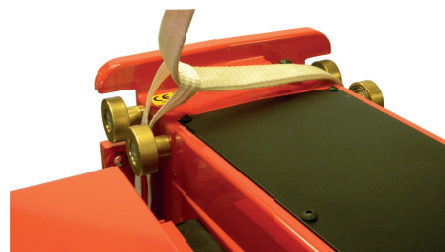
1



2



3



Lifting kits can be purchased as accessories.



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## 9. Mounting

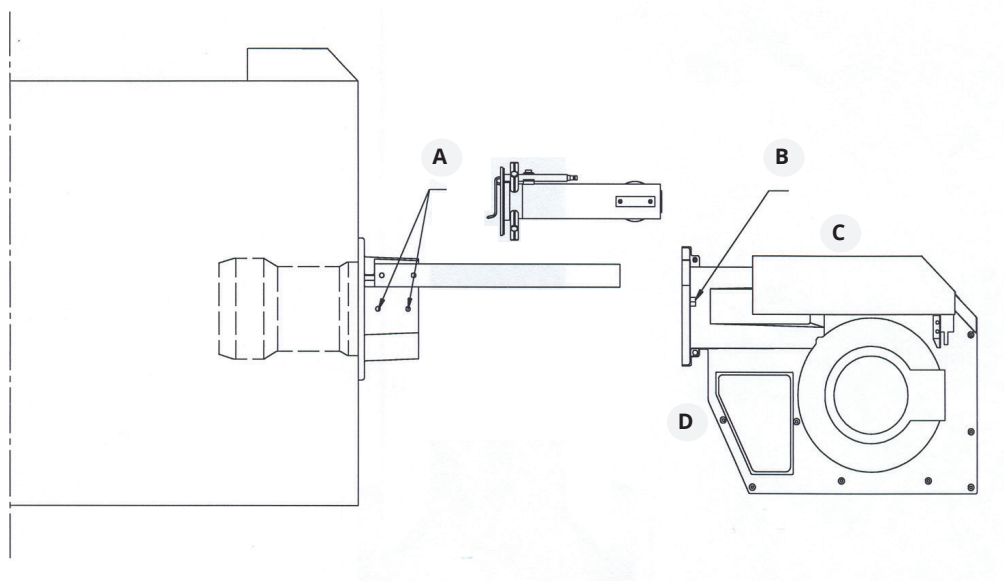
Mount the burner to the boiler using 4 bolts (if new fixing holes need to be drilled, use the fixing flange as a template).

Separate the fixing flange from the fan housing as follows:

1. Remove cover (C) from fan housing and disconnect ignition and ionization cables.
2. Disconnect the electrical cable to the gas valve.
3. Loosen nuts on both sides of the fixing flange.
4. Loosen end stop (C) for guides.
5. Pull the fixing flange with flame tube, nozzle assembly and gas fitting out of the fan housing.
6. Disconnect the connecting pipe from the fixing flange.
7. Check that the ignition electrodes are correctly set, see chapter Gas nozzle.
8. Fit the enclosed gasket to the flame tube.
9. Screw the fixing flange and the enclosed gasket onto the boiler, lift the fan housing onto the guides and mount in reverse order.
10. Connect the gas line, connect the supply cable, operating and safety circuits.



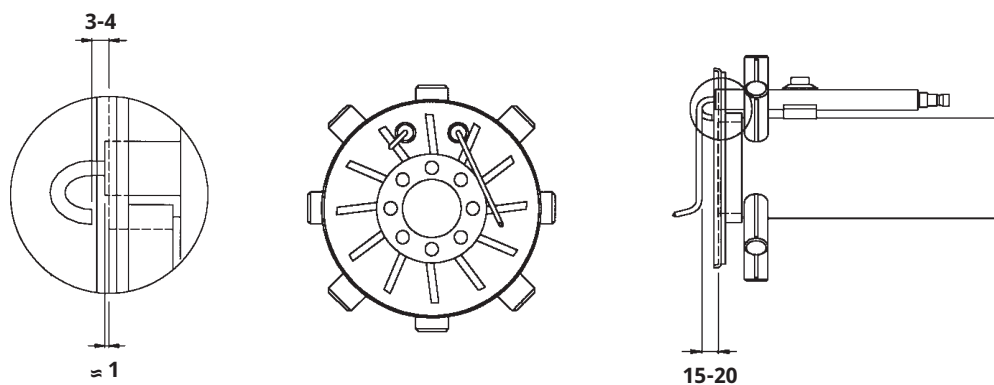
Before obtaining access to electrical and fuel line components all supply circuits must be disconnected.



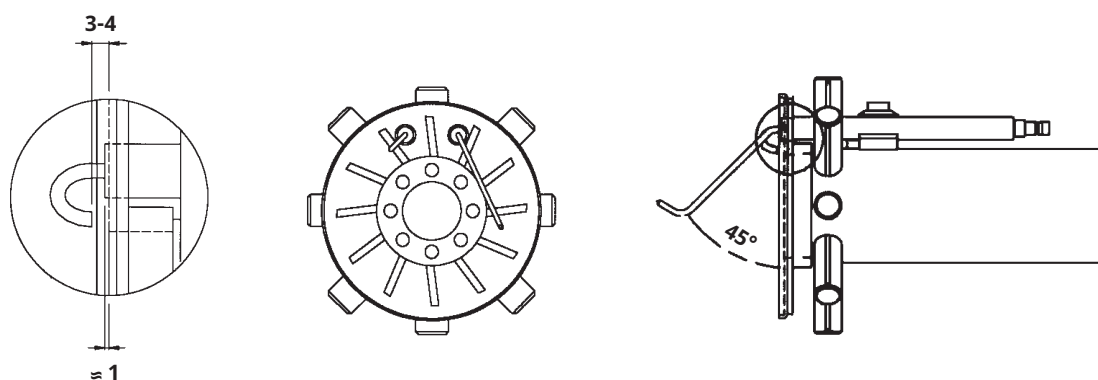
## 9.1 Gas nozzle

Check that the ignition electrodes are correctly set before mounting on the boiler.

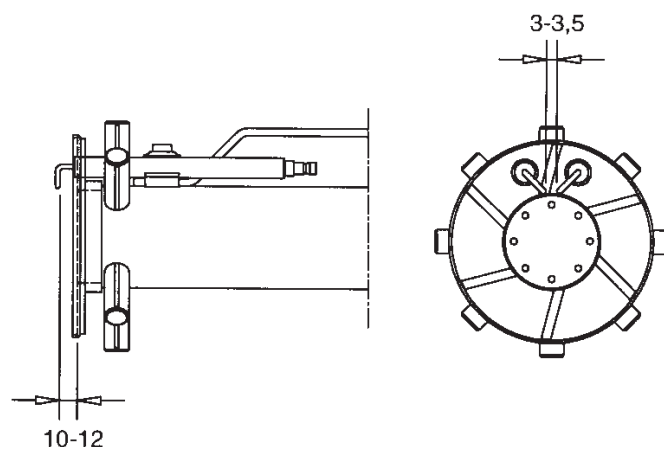
### Natural gas



### Propane



### Biogas (UV detector)



## 9.2 De-aerating

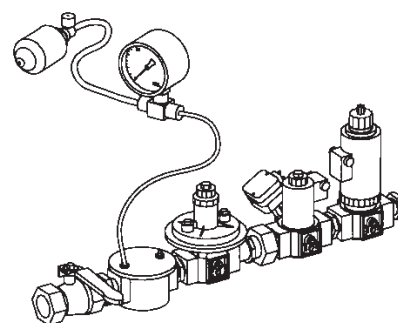
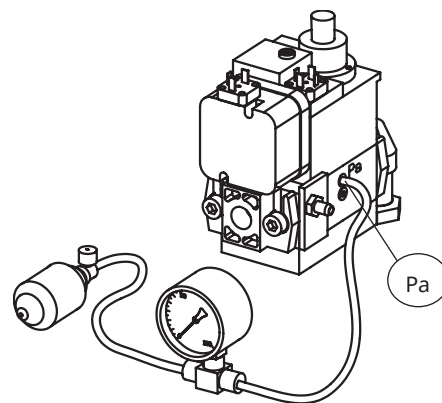
De-aerating the gas line by closing the tap to the gas connection and unscrewing the screw on the measuring nipple for the connection pressure. Connect a plastic hose, open the tap and drain the gas in a safe place. When the de-aerating is completed, be sure to refit the screw on the measuring nipple.

## 9.3 Leakage control

When checking for leakage, the solenoid valve must be closed. A pressure gauge is connected to the measuring nipple "Pa", see picture. The test pressure in the system must not be higher than max. connection pressure, see data plate. If leaks are found during measurement, locate the source using soapy water or leak detection spray. After sealing: check the leakage of the gas fixture again.



Check for leaks in the gas line.



## 9.4 Calculate prepurge time, Industrial applications

Prepurg time can be set on control unit LMV with parameter 225.

| Formula symbol | Description                                                                                                                                                                            | Example values      |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| V              | Volume fire box [m <sup>3</sup> ]                                                                                                                                                      | 10.5 m <sup>3</sup> |
| Q              | Burner output [kW]                                                                                                                                                                     | 1050 kW             |
| T              | Prepurg time [s]<br>Industrial applications according to EN 746.<br>The prepurg time must correspond to at least 5 complete air circulations in the fire box and adapted compartments. |                     |

Calculate prepurge time using the following formula:

|                                            |                                                                                         |
|--------------------------------------------|-----------------------------------------------------------------------------------------|
| $T = \frac{V \cdot 5}{Q \cdot 1.2 / 3600}$ | $T = \frac{10.5 \text{ m}^3 \cdot 5}{1050 \text{ kW} \cdot 1.2 / 3600} = 150 \text{ s}$ |
|--------------------------------------------|-----------------------------------------------------------------------------------------|



## 9.5 Calculation of gas flow

| Formula symbol | Description                                                                                                       | Example values          |
|----------------|-------------------------------------------------------------------------------------------------------------------|-------------------------|
| $V_N$          | Standard gas volume [Nm <sup>3</sup> /h]<br>Gas volume at normal condition 15 °C 1013 mbar                        | -                       |
| Q              | Boiler output [kW]                                                                                                | 1050 kW                 |
| $H_i$          | Lower calorific value of gas [kWh/m <sup>3</sup> ]<br>Natural gas under normal conditions 15 °C 1013 mbar, EN 676 | 9.45 kWh/m <sup>3</sup> |
| $\eta$         | Boiler efficiency (e. g. 90%)                                                                                     | 0.9                     |
| f              | Conversion factor (pressure and temperature compensation)                                                         | -                       |
| $t_{Gas}$      | Gas temperature at gas meter [°C]                                                                                 | 15 °C                   |
| $P_{Baro}$     | Barometric air pressure [mbar]                                                                                    | 945 mbar                |
| $P_{Gas}$      | Pressure of gas at the gas meter [mbar]                                                                           | 20 mbar                 |
| V              | Operating volume [m <sup>3</sup> /h]                                                                              | -                       |
| VG             | Gas flow measured at the gas meter [m <sup>3</sup> ]                                                              | 3.61 m <sup>3</sup>     |
| T              | Measuring time for consumed gas quantity [s]                                                                      | 95 s                    |

Calculate standard volume using the following formula:

$$V_N = \frac{Q}{\eta \cdot H_i} \quad V_N = \frac{1050 \text{ kW}}{0.9 \cdot 9.45 \text{ kWh/m}^3} = 123.5 \text{ m}^3/\text{h}$$

Calculate conversion factor using the following formula:

$$f = \frac{273}{273 + t_{Gas}} \times \frac{P_{Baro} + P_{Gas}}{1013} \quad f = \frac{273}{273 + 15} \cdot \frac{945 + 20}{1013} = 0.90$$

Calculate gas volume using the following formula:

$$V = \frac{V_N}{f} \quad V = \frac{123.5 \text{ m}^3/\text{h}}{0.90} = 136.8 \text{ m}^3/\text{h}$$

Determine operating volume with the following formula:

$$V = \frac{3600 \cdot V_G}{T} \quad V = \frac{3600 \cdot 3.61 \text{ m}^3}{95 \text{ sek}} = 136.8 \text{ m}^3/\text{h}$$

| Height above sea level [m] | 0    | 100  | 200 | 300 | 400 | 500 | 600 | 700 | 800 | 900 | 1000 | 1100 | 1200 |
|----------------------------|------|------|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| $P_{Baro}$ [mbar]          | 1013 | 1001 | 989 | 977 | 966 | 954 | 943 | 932 | 921 | 910 | 899  | 888  | 877  |

### Calorific value of the gas

| Gas quality |     | kWh/Nm <sup>3</sup> | MJ/Nm <sup>3</sup> |
|-------------|-----|---------------------|--------------------|
| Natural gas | G20 | 9.5                 | 34.02              |
| Natural gas | G25 | 8.2                 | 29.25              |

| Gas quality |     | kWh/Nm <sup>3</sup> | MJ/Nm <sup>3</sup> |
|-------------|-----|---------------------|--------------------|
| Butan       | G30 | 32.25               | 116.09             |
| Propan      | G31 | 24.44               | 88.00              |
| Biogas      |     | 6.0                 | 21.60              |

Lower calorific value  $H_i$  at normal conditions 15 °C and 1013 mbar, EN 676.  
For exact calorific value of the gas, contact the gas distributor.

## 7. Settings

### 7.1 Startup

After the burner has been mounted on the boiler and the electrical connection, de-aeration and tightness control have been performed, the burner is ready to start-up.

Read the sections dealing with settings of gas valve, damper motor and combustion device before start-up.

Open the ball valve and turn on the main switch, start the burner and begin setting up the system.

### 7.2 Control of combustion

Check combustion using flue gas analysis instruments. Set the burner to about 20% excess air and check that good combustion is obtained. Check the actual gas flow on the gas meter to ensure that the correct input power is achieved.

## 7.3 Setting the air pressure switch

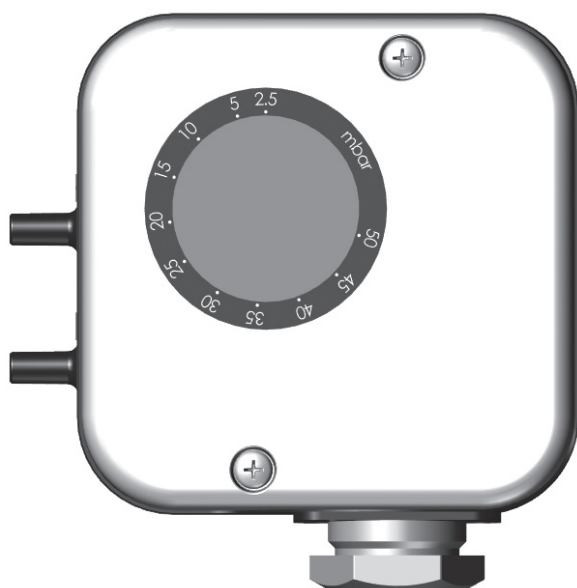
The air pressure switch must block the burner if the amount of air for combustion becomes too low. The air pressure switch must be set so that in the event of a lack of air supply at the burner's max. or min. capacity reacts before the monitored pressure drops so much that poor combustion occurs.

1. Remove protective cover.



Be careful when adjusting the air pressure switch; it contains a live component.

2. Start the burner.
3. Carefully turn the scale on the air pressure switch clockwise until the air pressure switch stops the burner.
4. Measure and note the lowest air pressure in the entire work area.
5. Set the air pressure switch to about 10-15% lower than the lowest noted pressure.
6. Test run the burner and check the function in the entire work area.
7. Refit protective cover.



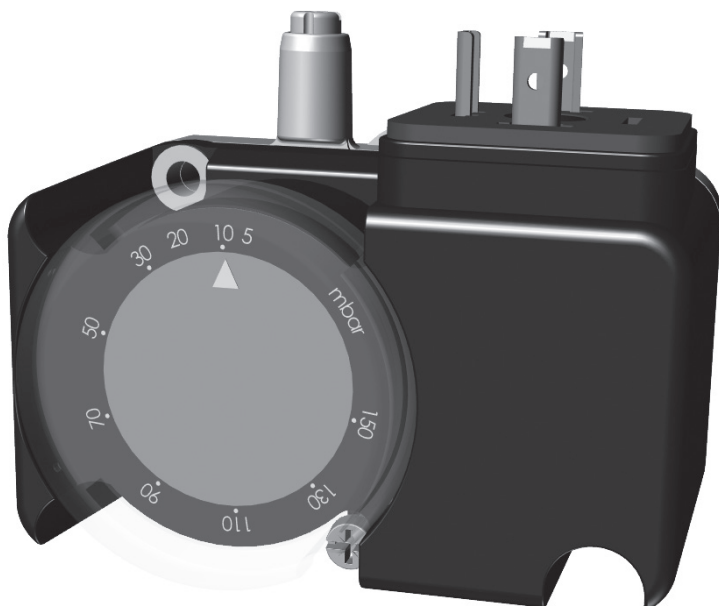
## 7.4 Setting the gas pressure switch, min.

The gas pressure switch must react to too low a connection pressure to the burner, prevent the burner from starting and stop the burner during operation. The burner may start again when the connection pressure has risen above the set pressure on the gas pressure switch.

1. Remove protective cover.
2. Open measuring socket and connect a manometer for measuring connection pressure.
3. Start the burner.
4. Measure and note the connection pressure to the burner at the highest input power.
5. Set the gas pressure switch to a value 10-15% lower than the noted pressure.
6. Check the setting by carefully closing the ball valve and at the same time measuring the connection pressure.
7. When the gas pressure switch stops the burner, the measured value must approximately correspond to the setting on the gas pressure switch.
8. Open ball valve.
9. Remove manometer and close measuring socket.
10. Refit protective cover.



Check gas tightness.



## 7.5 Setting Damper motor, Modulating operation

### Air adjustment

The damper motor rotates the air damper between three preset positions: completely closed, low load and high load. These positions are controlled in the motor by colored cam discs:

- Orange cam disc is adjusted for low load (approx. 5-10°).
- Red cam disc is adjusted for high load (approx. 90°).
- Blue cam disc is factory set for closed air damper during standstill.
- Black cam disc has no function during sliding and modulating operation.

### Setting amount of gas

- Before starting the burner, vent the line so that gas is safely available at the gas valve.
- Connect a manometer for measuring outlet pressure (PBr).
- Set the control switch to the MAN position.
- Set gas pressure switch min and air pressure switch in position MIN and (if mounted) gas pressure switch max in position MAX.
- Start burner. If no flame is formed and the manometer does not give a reading, adjust the amount of gas by increasing with screw N on the gas valve. Check combustion values.
- Set high load by pressing "+" control switch (increase). Adjust the amount of gas with screw V on the gas valve and check the combustion values.

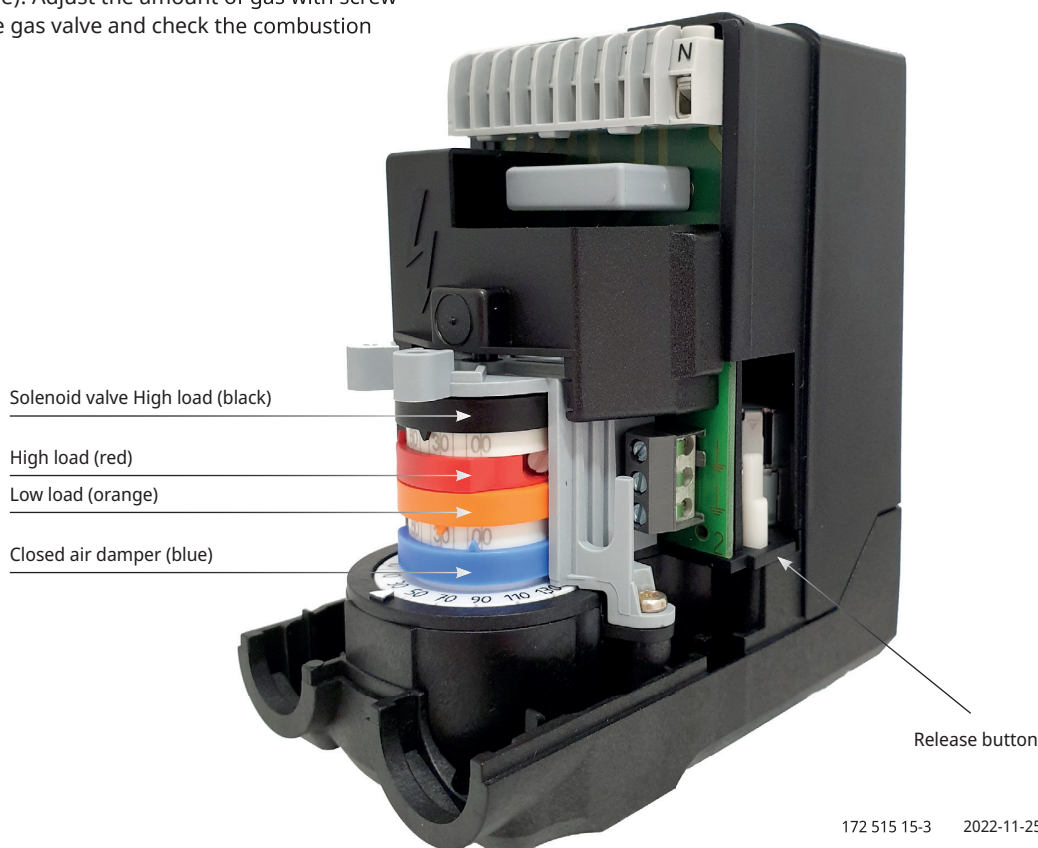
- Return to low load "-", check combustion value and adjust if necessary.
- If necessary, repeat the setting on low (N) and high load (V).
- Adjust the orange and red cam discs to obtain the desired effect on low and high loads. Check the amount of gas on the system's gas meter.
- Adjust air and gas pressure switches after adjustment, see special instructions.
- Set the control switch to the AUTO position.

### Release

By pressing the button, the motor is disengaged and the air damper can be turned. The function is used when servicing air dampers.

### Recommended excess air

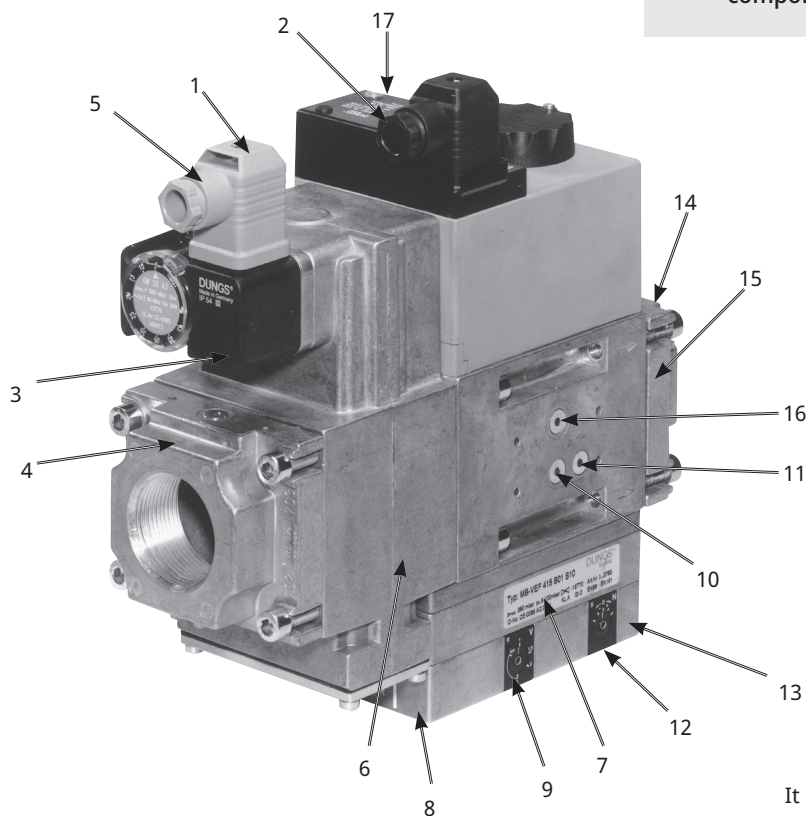
| Gas quality             | Excess air flue gases |                              | Max % CO <sub>2</sub> |
|-------------------------|-----------------------|------------------------------|-----------------------|
|                         | % O <sub>2</sub>      | % CO <sub>2</sub> Lambda 1.2 |                       |
| Natural gas             | 3 - 5                 | ≈10                          | 11.9                  |
| Propane                 | 3 - 5                 | ≈11.5                        | 13.9                  |
| Butane                  | 3 - 5                 | ≈11.5                        | 14.1                  |
| Liquefied petroleum gas | 3 - 5                 | ≈11                          | 13.8                  |
| Biogas                  | 3 - 5                 |                              |                       |



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## 8. Gas valve, MultiBloc VEF 415-425 B01

**!** All components must be installed without being bent, twisted or subjected to mechanical or thermal forces which can affect the components.



It is possible to connect a leakage control VPS 504 and a gas pressure switch max to the gas valve.

- |                                                            |                                                                 |
|------------------------------------------------------------|-----------------------------------------------------------------|
| 1. Electrical connection gas pressure switch min           | 11. Connection for measurement of burner pressure after V2      |
| 2. Electrical connection gas valve                         | 12. Adjustment screw for zero point adjustment N (min. load)    |
| 3. Pressure switch min                                     | 13. Test point connection 1/8" $P_F$                            |
| 4. Flange connection inlet                                 | 14. Test point connection 1/8" $P_{Br}$ (after V2 burner)       |
| 5. Test point connection 1/8" before V1                    | 15. Flange connection, outlet                                   |
| 6. Filter (on MultiBloc 425 external filter)               | 16. Test point connection 1/8" $P_a$ before V2 (after governor) |
| 7. Data plate                                              | 17. Indication of V1 and V2 in operation (not standard)         |
| 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 V1 (before governor) |                                                                 |

## 8.1 Technical data

- Max inlet pressure 360 mbar
- Valves V1+V2 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°C- +70°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

## 8.2 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.

## 8.3 Adjustment possibilities

Adjustment range



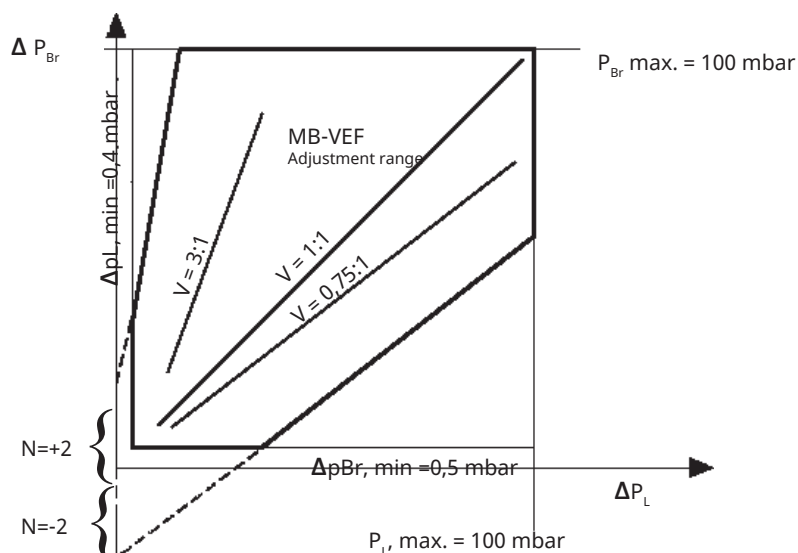
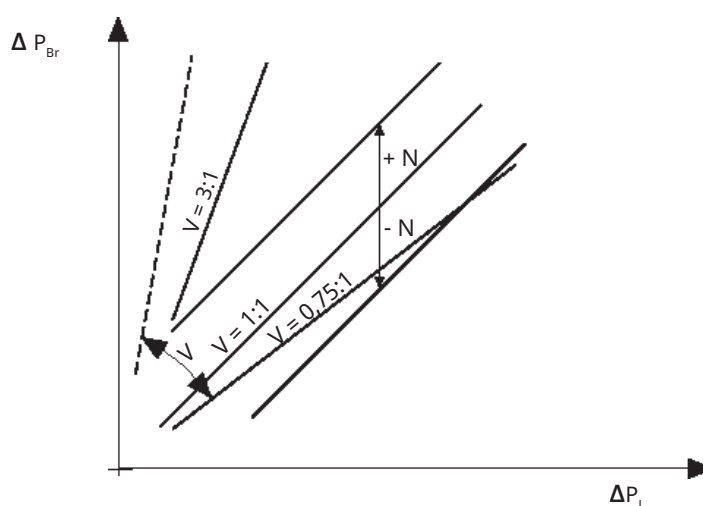
Effective burner pressure

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



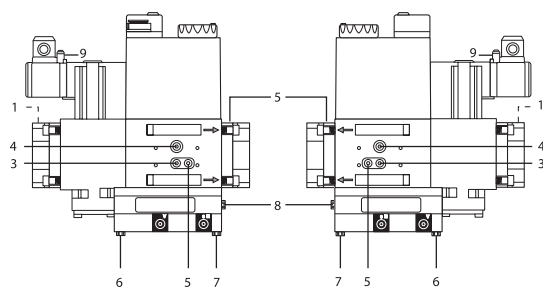
Effective fan pressure

$$\Delta P_L = P_L - P_F$$

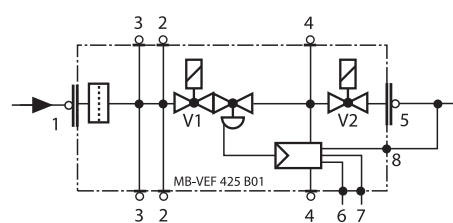
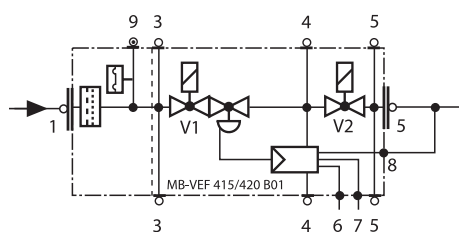
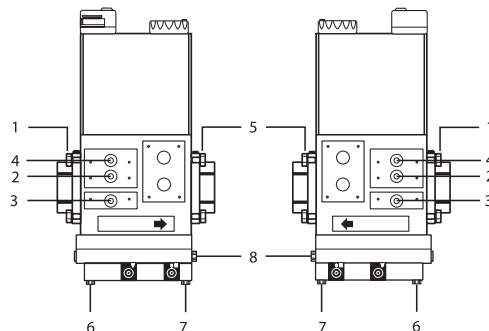


## 8.3.1 Pressure taps

MB-VEF 415  
MB-VEF 420



MB-VEF 425



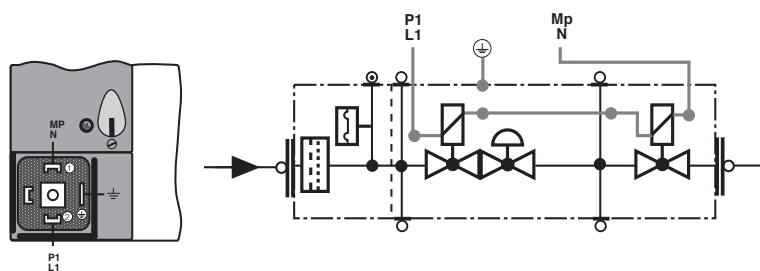
1, 2, 3, 4, 5 G1/8 screwed seal plug

9 Test nipple

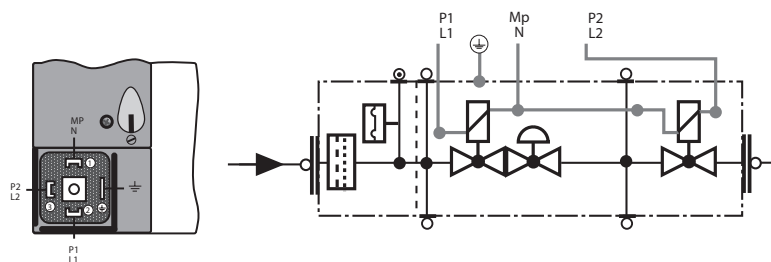
6, 7, 8 Pulse lines  $P_L$ ,  $P_F$  and  $P_{Br}$

## 8.3.2 Electrical connection

S 10/S 30



S 12/S 32





## 8. Leakage control VPS 504

### 8.1 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<br>Fault output T7: 1A<br>Fault output SO4 1, 2, 3, T7: 1A |
| Release time                            | ≈ | 10 - 30 s<br>Dependent on test volume and input pressure.                                      |
| Sensitivity limit                       |   | 50 l/h                                                                                         |
| Max. number of test cycles              |   | 20 /h                                                                                          |

### 8.2 Program sequence

Idle state: Valves 1 and 2 are closed. Pressure buildup: 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 dependent 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.

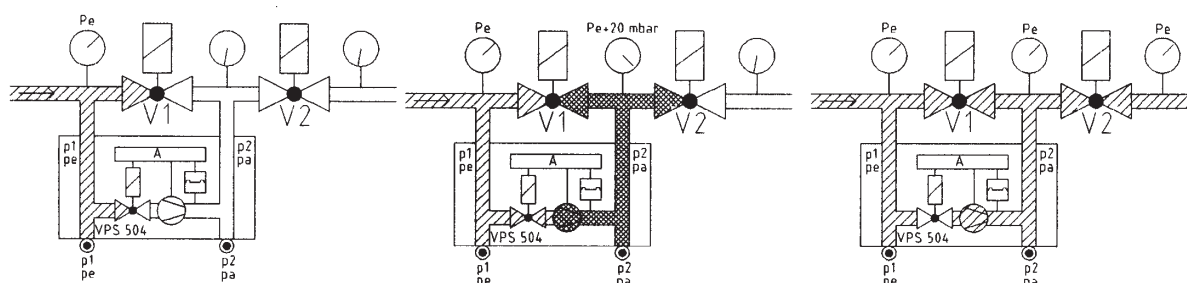
If the test section is leaky or if the pressure increase by + 20 mbar is not attained during the test period (max. 26 s), the VPS 504 generates a fault. The red LED is lit as long as the contact is released by the regulator (heat requirement).

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

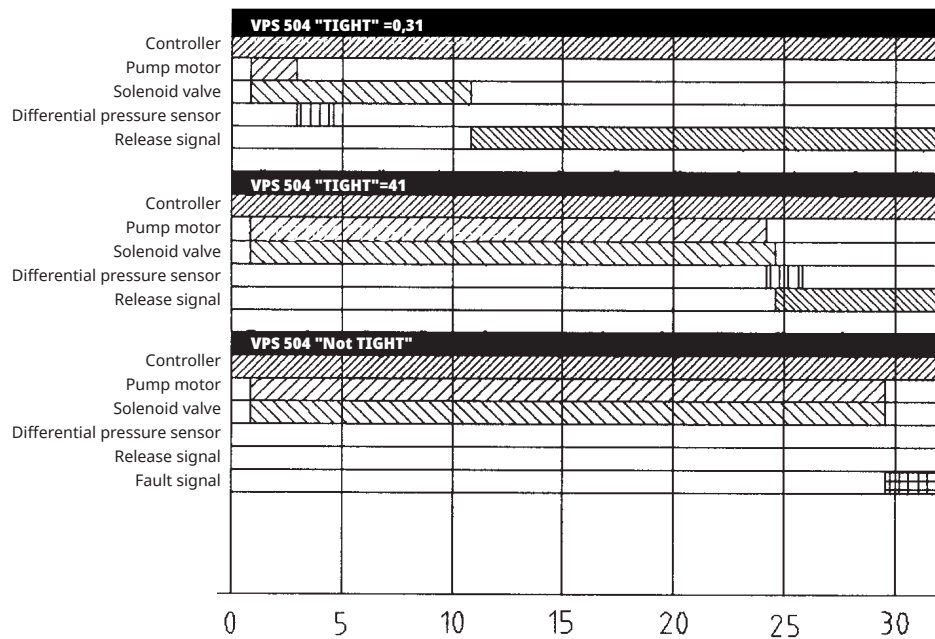
Programmer Idle state

Pressure buildup

Operation



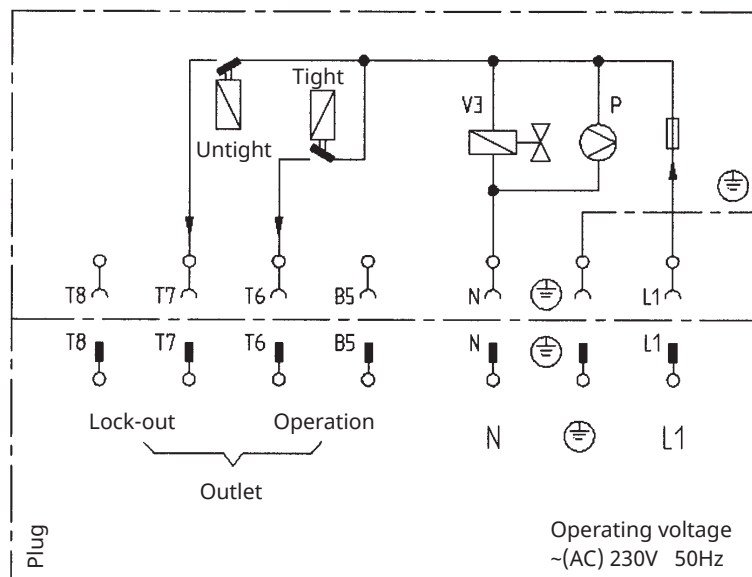
## 8.2.1 Program sequende schedule



## 8.3 Electrical connection

The VPS 504 is connected in series between the temperature regulator and the control box via a 7-pin plug connector.

See wiring diagram!



## 13. Service

Service and maintenance work may only be performed by qualified personnel. Perform operational check of all safety systems and components at each service. Only Enertech original parts should be used when replacing components.



Use caution when operating the burner, surfaces may be hot.



### 13.1 Burner Service Schedule, Gas

Servicing must be carried out once a year or after 3,000 hours of operation.

|                                       |                                                  |                                                   |
|---------------------------------------|--------------------------------------------------|---------------------------------------------------|
| Burner                                | 1 year                                           | 3,000 h                                           |
| Inspection of electrical installation | 1 year                                           | 3,000 h                                           |
| Leak check                            | 1 year                                           | 3,000 h                                           |
| Filter                                | 1 year, replacement at $\Delta p > 10$ mbar      | 3,000 h, replacement at $\Delta p > 10$ mbar      |
| Electrodes                            | Replacement/cleaning 1 year                      | Replacement/cleaning 3,000 h                      |
| Brake plate                           | Replacement/cleaning 1 year                      | Replacement/cleaning 3,000 h                      |
| Motor                                 | 1 year                                           | 3,000 h                                           |
| Fan wheel                             | 1 Year<br>Replace if need for cleaning/imbalance | 3,000 h<br>Replace if need for cleaning/imbalance |

### 13.2 Component replacement intervals

| Components                       | Service life - Recommended replacement | Service life - Recommended replacement Operating cycles |
|----------------------------------|----------------------------------------|---------------------------------------------------------|
| Control system                   | 10 years                               | 250,000 starts                                          |
| Valve control system             | 10 years                               | 250,000 starts                                          |
| Pressure switch                  | 10 years                               | 250,000 starts                                          |
| Ignition system with flame guard | 10 years                               | 250,000 starts                                          |
| UV flame sensor                  | 10,000 h                               | N/A                                                     |
| Gas pressure controls            | 15 years                               | N/A                                                     |
| Gas valve without leak testing   | 10 years                               | 250,000 starts                                          |
| Gas valve with leak testing      | Replacement upon fault detection       | N/A                                                     |
| Gas pressure switch              | 10 years                               | 250,000 starts                                          |
| Safety blow-off system           | 10 years                               | N/A                                                     |
| Damper motor                     | N/A                                    | 500,000 starts                                          |
| Contactor                        | 10 years                               | 500,000 starts                                          |



The burner and its components must be recycled according to applicable regulations.

### 13.3 Combustion device

1. Disconnect the main power and shut off the fuel supply.

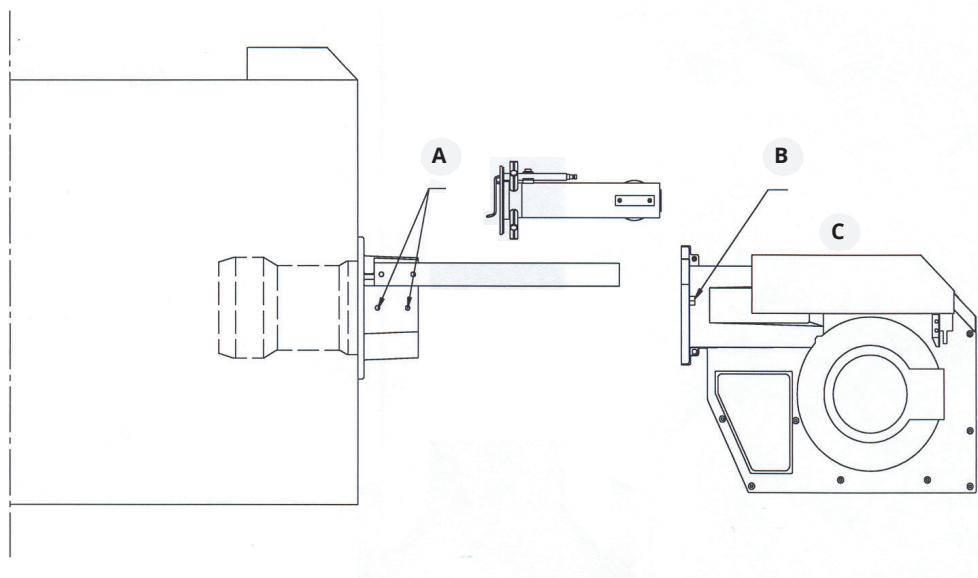


Before obtaining access to electrical and fuel line components all supply circuits must be disconnected.

2. Remove cover (C) from fan housing and disconnect ignition and ionization cables.
3. Loosen nut (B) and pull out the fan housing on the guides.
4. By loosening screw(s) (A), the combustion device is released and can be lifted out from the burner.
5. Check and clean the brake plate and gas inlet, replacing components as necessary.
6. Check that the ignition and ionisation electrodes are correctly set, (see Gas nozzle chapter) - replace if necessary.
7. Refit the combustion device in reverse order.
8. Press the burner together and lock with nut (B).
9. Switch on the main power and open the fuel supply.
10. Start burner and check/adjust combustion.



Check for leaks in the gas line.



When servicing/replacing components that affect combustion, flue gas analysis and soot test must be carried out following installation.

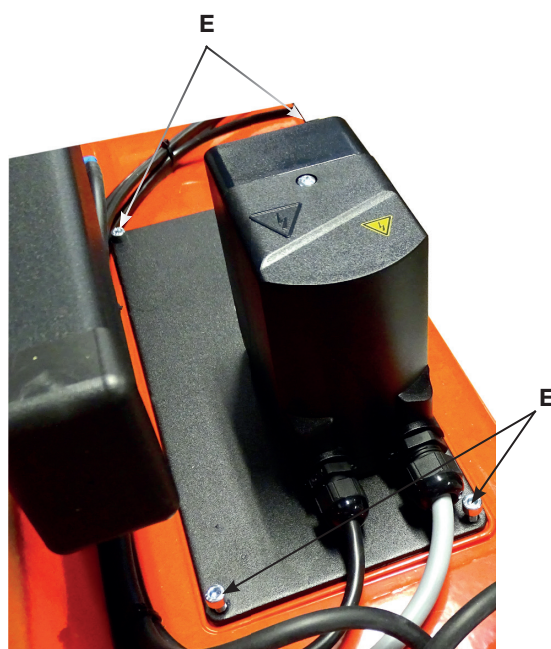
## 12.4 Air damper

1. Disconnect the main power and shut off the fuel supply.



Before obtaining access to electrical and fuel line components all supply circuits must be disconnected.

2. Remove cover (C) from fan housing and disconnect ignition and ionization cables.
3. Loosen nut (B) and pull out the fan housing on the guides.
4. Remove the intake grille (D) to the air intake.
5. Loosen screws (E) holding the damper motor fixing plate and lift the damper motor out.
6. Clean the air damper and air intake, lubricate the damper shaft if necessary.
7. Refit the damper motor and mounting plate, ensuring that the damper shaft and control arm are correctly connected.
8. Fit the intake grille.
9. Press the burner together and lock with nut (B).
10. Switch on the main power and open the fuel supply.
11. Start burner and check/adjust combustion.



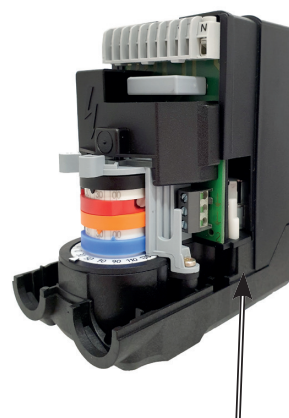
## 12.5 Replacement, Damper motor air

1. Disconnect the main power and shut off the fuel supply.



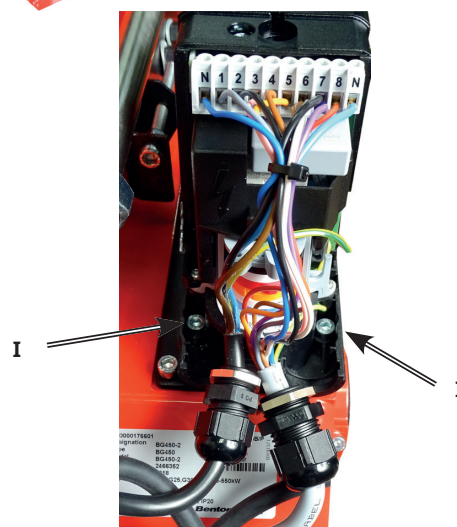
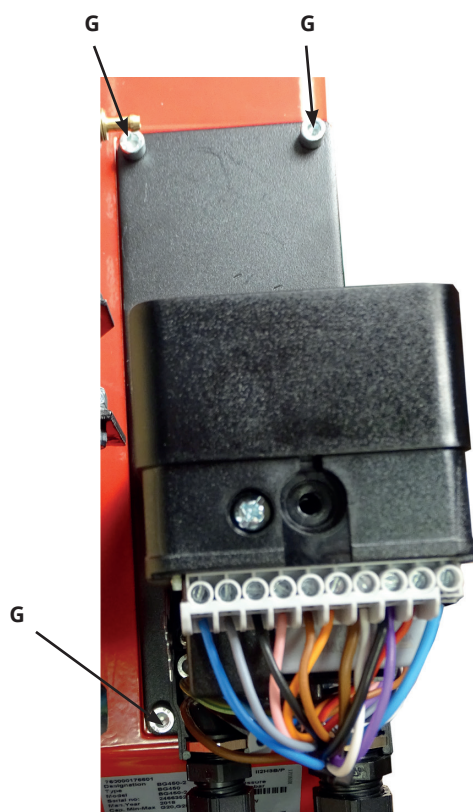
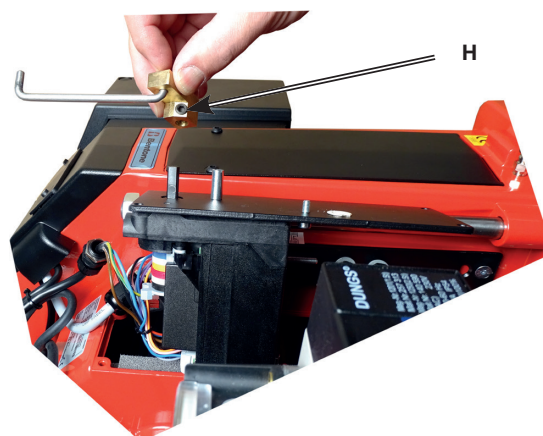
Before obtaining access to electrical and fuel line components all supply circuits must be disconnected.

2. Note the connection position of cables to the damper motor.
3. Disconnect cables from damper motor.
4. Loosen screws (G) to the damper motor fixing plate.
5. Disengage the damper motor and turn it to approx. 70°.
6. Lift up damper motor.
7. Remove the control arm (H) from the motor shaft.
8. Loosen screws (I) securing the damper motor to the fixing plate. Adjust the cams of the new damper motor according to the replaced motor, see chapter "Setting Damper motor" and fit the fixing plate.
9. Fit the control arm on the shaft of the damper motor. It is important that the screw is perpendicular to the flat surface of the shaft.
10. Refit the damper motor and mounting plate, ensuring that the damper shaft and control arm are correctly connected.
11. Connect the damper motor cable.
12. Switch on the main power and open the fuel supply.
13. Start burner and check/adjust combustion.



### 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.



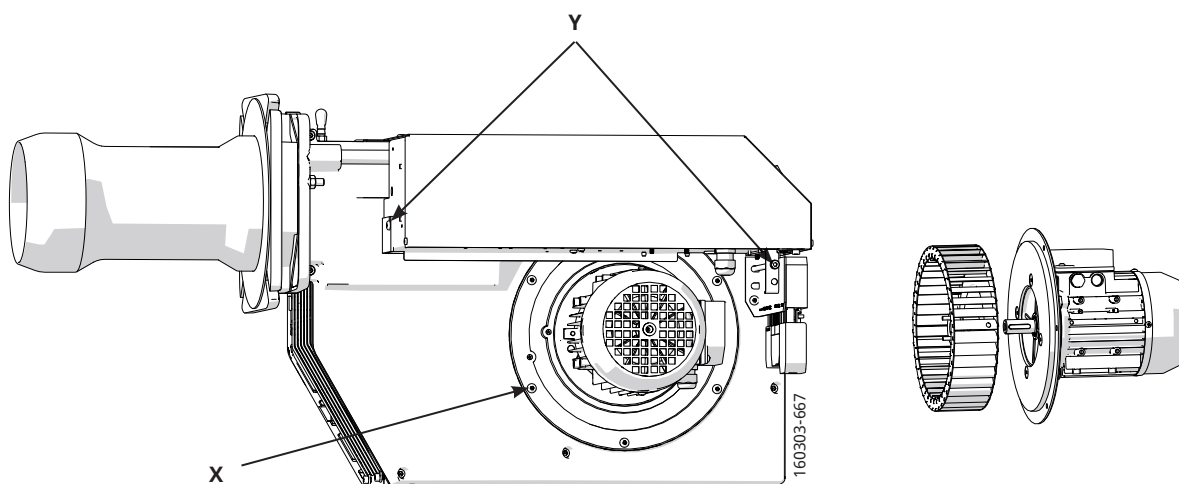
## 13.7 Fan

1. Disconnect the main power and shut off the fuel supply.



Before obtaining access to electrical and fuel line components all supply circuits must be disconnected.

2. Detach the electrical panel (Y).
3. Loosen the motor electrical connection and screws (X) enough to turn and lift out the motor.
4. Check the fan wheel attachment and any skew, replace if damaged.
5. Clean or replace the fan wheel.
6. Refit the parts.
7. Switch on the main power and open the fuel supply.
8. Start burner and check/adjust combustion.



When servicing/replacing components that affect combustion, flue gas analysis and soot test must be carried out following installation.



## 13.8 Vibrations

Maximum permitted vibration level is 5.0 mm/s.

- Check tightness of fasteners.
- Check fan wheel for damage and contamination (replace if necessary).
- Check motor shaft and bearings. If they are worn, replace the motor.

Use screw to attach the vibration sensor.



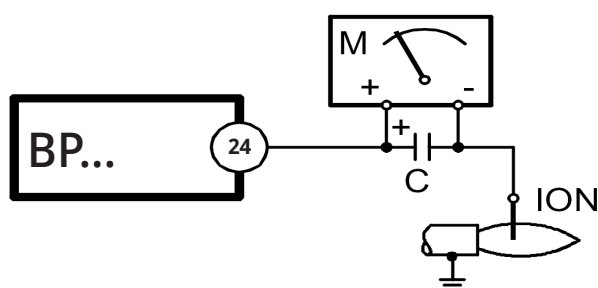


## 10.8 Flame monitoring and ionisation current check

The standard version of the burner is monitored according to the ionisation principle. The ionisation current should be checked on initial start-up and at each service visit.

The cause of low ionisation current can be leakage current, poor connection to earth, fouling, or the angle of the ionisation electrode may need to be adjusted. Occasionally, an incorrect gas/air mix may result in poor ionisation current. Ionisation current is measured using a micro ammeter ( $\mu\text{A}$ ) connected in series with the ionisation electrode and gas burner control. Connect the  $\mu\text{A}$  meter according to the diagram. The minimum required ionisation current is shown in the table. In practice, this current must be significantly higher, preferably more than  $10\text{ }\mu\text{A}$ . Connection of the  $\mu\text{A}$  instrument is made easier by the fact that all gas burners are equipped with a divisible ionisation cable.

| Technical data                                                                                                                                                                     |                      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|
| For continuous operation!                                                                                                                                                          |                      |
| Idle voltage at ION-terminals                                                                                                                                                      | AC 330 V             |
| <div style="display: flex; align-items: center;"> <div style="font-size: 2em; margin-right: 10px;">!</div> <div>Protect the ionisation electrode from electric shock!</div> </div> |                      |
| Short-circuit current                                                                                                                                                              | Max 0,5mA            |
| Min. current for flame detection                                                                                                                                                   | Min 3 $\mu\text{A}$  |
| Required current to ensure detection                                                                                                                                               | Min 3 $\mu\text{A}$  |
| Possible detection current                                                                                                                                                         | Max 20 $\mu\text{A}$ |



## 10.9 UV-5 detector

This should not be exposed to temperatures higher than  $60^{\circ}\text{C}$ . The signal running through the UV probe when it is illuminated cannot be measured. To check the flame, perform the following:

The LEDs can show the flame strength in Control mode by pressing the reset button for 3 seconds when the Flame LED flashes during start-up. In Control mode, the Status LED shines yellow, the Fan LED flashes, and LEDs 2-6 show the flame signal strength. Each LED corresponds to 20% of the total flame signal. 5 lit LEDs correspond to 100% and 2 LEDs correspond to 40%.

## 13.11 Replacement of electrical components

1. Disconnect the main power and switch off the fuel supply.



Before obtaining access to terminals, all supply circuits must be disconnected.

2. Note the connection of the existing component and disassemble.
3. Fit new component with same connection or with specified alternative connection.
4. Switch on the main power and check the operation of the new component.
5. Start burner and check/adjust combustion.



When servicing/replacing components that affect combustion, flue gas analysis and soot test must be carried out following installation.

## 14. 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.



Review and service should be performed by authorised personnel only.

## 15. Troubleshooting

Conditions favourable to trouble-free operation of the system can only be guaranteed through the interaction between three factors: electricity, gas flow and combustion air. If any of these factors change, it may cause a malfunction.

Before requesting servicing, check the following points:

1. Are the system's gas taps open?
2. Are the fuses intact and is the power on?
3. Are control devices (room thermostat, boiler thermostat, etc.) correctly set?
4. Is there sufficient gas pressure to the burner?
5. Are the burner controls on standby and not locked?
6. Is there sufficient air supply to the burner?

| Cause of fault                | Action                                                 |
|-------------------------------|--------------------------------------------------------|
| <b>Burner does not start:</b> |                                                        |
| No gas.                       | Make sure all gas taps are open.                       |
| No power.                     | Check the fuse, thermostat and electrical connections. |
| Burner motor does not start.  | Motor protection has tripped. Motor faulty.            |
| Burner control faulty.        | Replace.                                               |

|                                                                            |                                                      |
|----------------------------------------------------------------------------|------------------------------------------------------|
| <b>Burner motor running, no ignition spark at the end of pre-aeration:</b> |                                                      |
| No power in the terminals.                                                 | Check the connector. Replace faulty burner controls. |
| Ignition electrodes in contact with each other or earth.                   | Adjust.                                              |
| Ignition electrode porcelain damaged.                                      | Replace the electrodes.                              |
| Poor connection to cable connectors.                                       | Adjust connection.                                   |
| Ignition cables damaged.                                                   | Replace.                                             |
| Transformer damaged, no power to secondary winding.                        | Replace the transformer.                             |
| Ignition cable and ionisation cable swapped around.                        | Reconnect.                                           |

|                                                                                                  |                                                        |
|--------------------------------------------------------------------------------------------------|--------------------------------------------------------|
| <b>No flame propagation:</b>                                                                     |                                                        |
| Gas solenoid valve faulty.                                                                       | Replace.                                               |
| Gas solenoid valve does not open despite having power.                                           | Replace solenoid valve terminals, or entire valve.     |
| No power to solenoid valve.                                                                      | Check the connection.                                  |
| No electrical connection through air pressure gauge.                                             | Check the air pressure gauge's settings and functions. |
| Ignition load incorrectly set.                                                                   | Increase/decrease gas supply Reduce airflow.           |
| Burner control faulty                                                                            | Replace                                                |
| Air pressure gauge incorrectly set or faulty                                                     | Check the settings and reset, or replace               |
| No acknowledgement signal due to incorrect adjustment or misalignment of the control motor cams. | Check the settings and realign.                        |

|                                                                        |                                                                      |
|------------------------------------------------------------------------|----------------------------------------------------------------------|
| <b>Burner trips after safety time limit despite flame propagation:</b> |                                                                      |
| No ionisation current or UV cell incorrectly positioned.               | Adjust ionisation electrode and UV cell Check cables and connectors. |
| Burner control monitor faulty.                                         | Replace burner control.                                              |
| Voltage lower than 185V.                                               | Contact an electrician.                                              |
| Ignition electrodes disrupting ionisation current.                     | Adjust ignition electrodes. Re-polarise the transformer.             |
| Poor earth connection.                                                 | Ensure adequate earth connection.                                    |
| Phase and neutral swapped around.                                      | Check wiring diagram and change accordingly.                         |

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| Cause of fault                                                                | Action                                                                                  |
|-------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| <b>Burner trips during pre-aeration:</b>                                      |                                                                                         |
| Air sensor faulty or incorrectly set.                                         | Increase/decrease air setting. Reduce air volume.                                       |
| Ignition load incorrectly set.                                                | Increase/decrease gas supply Reduce airflow.                                            |
| Gas pressure too low.                                                         | Increase pressure. If necessary, contact gas supplier.                                  |
| <b>Pulsations at start-up:</b>                                                |                                                                                         |
| Ignition electrodes incorrectly set.                                          | Adjust .                                                                                |
| Gas pressure too high.                                                        | Check and adjust using pressure gauge and pressure control valve.                       |
| Flue gas side blocked.                                                        | Check the chimney flue.                                                                 |
| <b>Burner pulsates during operation:</b>                                      |                                                                                         |
| Burner incorrectly set.                                                       | Adjust.                                                                                 |
| Burner dirty.                                                                 | Clean the burner.                                                                       |
| Incorrect chimney.                                                            | Check and modify dimensions if necessary.                                               |
| <b>Burner functioning properly but with occasional blockage:</b>              |                                                                                         |
| Ionisation current too low.                                                   | Check. Must be at least 6µA, but should ideally lie between 8-20µA.                     |
| UV cell incorrectly positioned.                                               | Adjust.                                                                                 |
| Voltage drop at certain times.                                                | Must not drop below 15% of rated voltage. Contact an electrician if necessary.          |
| Incorrectly set or faulty air sensor.                                         | Check the settings and reset, or replace.                                               |
| Ignition electrode overload.                                                  | Replace.                                                                                |
| Burner control ambient temperature too high.                                  | Insulate for heat, Max. 60 °C.                                                          |
| Ignition spark too weak.                                                      | Check the transformer.                                                                  |
| <b>Poor combustion:</b>                                                       |                                                                                         |
| Poor draught conditions.                                                      | Check the chimney.                                                                      |
| Flue gas temperature too high.                                                | Boiler overloaded Decrease the gas volume, sweep the chimney if necessary.              |
| CO2 content too low.                                                          | Choke the air supply. Check the boiler for any leakages. Choke the draught if too high. |
| <b>CO content too high:</b>                                                   |                                                                                         |
| Surplus air when using natural gas and liquefied petroleum (propane, butane). | Choke the air supply.                                                                   |
| Poor air supply.                                                              | Open the air supply. Check flue gas damper.                                             |
| Holes in gas nozzle clogged.                                                  | Clean.                                                                                  |
| Poor fresh air intake.                                                        | Check and increase.                                                                     |
| Flame at incorrect angle due to combustion head out of position.              | Check the combustion head and readjust.                                                 |
| <b>Condensation build up in boiler and chimney:</b>                           |                                                                                         |
| Flue gas temperature too low or gas volume too low.                           | Raise the flue gas temperature by increasing gas volume Insulate the chimney.           |

## 16. Service- and inspection protocol

|                      |  |               |                       |
|----------------------|--|---------------|-----------------------|
| <b>Installation</b>  |  | <b>Boiler</b> |                       |
| <b>Name:</b>         |  | <b>Type:</b>  | <b>Efficiency kW:</b> |
| <b>Address:</b>      |  | <b>Burner</b> |                       |
|                      |  | <b>Type:</b>  | <b>Efficiency kW:</b> |
| <b>Installed by:</b> |  | <b>Date:</b>  |                       |

| Date |                       | Governor |       | CO <sub>2</sub> | CO | Fluegas temp | Ionisation current | Pressure  |         | Efficiency |
|------|-----------------------|----------|-------|-----------------|----|--------------|--------------------|-----------|---------|------------|
|      | Nm <sup>3</sup> gas/h |          |       |                 |    |              |                    | Fire room | Chimney |            |
|      |                       | Before   | After | %               | %  | °C           | µ A                | mbar      | mbar    | %          |
|      | Small Flame           |          |       |                 |    |              |                    |           |         |            |
|      | Large Flame           |          |       |                 |    |              |                    |           |         |            |
|      | Measures              |          |       |                 |    |              |                    |           |         |            |

| Date |                       | Governor |       | CO <sub>2</sub> | CO | Fluegas temp | Ionisation current | Pressure  |         | Efficiency |
|------|-----------------------|----------|-------|-----------------|----|--------------|--------------------|-----------|---------|------------|
|      | Nm <sup>3</sup> gas/h |          |       |                 |    |              |                    | Fire room | Chimney |            |
|      |                       | Before   | After | %               | %  | °C           | µ A                | mbar      | mbar    | %          |
|      | Small Flame           |          |       |                 |    |              |                    |           |         |            |
|      | Large Flame           |          |       |                 |    |              |                    |           |         |            |
|      | Measures              |          |       |                 |    |              |                    |           |         |            |

| Date |                       | Governor |       | CO <sub>2</sub> | CO | Fluegas temp | Ionisation current | Pressure  |         | Efficiency |
|------|-----------------------|----------|-------|-----------------|----|--------------|--------------------|-----------|---------|------------|
|      | Nm <sup>3</sup> gas/h |          |       |                 |    |              |                    | Fire room | Chimney |            |
|      |                       | Before   | After | %               | %  | °C           | µ A                | mbar      | mbar    | %          |
|      | Small Flame           |          |       |                 |    |              |                    |           |         |            |
|      | Large Flame           |          |       |                 |    |              |                    |           |         |            |
|      | Measures              |          |       |                 |    |              |                    |           |         |            |



# EU Declaration of conformity

## Bentone Gas Burners

| Type:   | Certificate No. | Type:  | Certificate No. |
|---------|-----------------|--------|-----------------|
| BFG 1   | CE-0123CT1269   | BG 550 | CE-0123CT1326   |
| STG 120 | CE-0123CT1270   | BG 650 | CE-0123CT1348   |
| STG 146 | CE-0123CT1281   | BG 700 | CE-0123CT1359   |
| BG 300  | CE-0123CT1292   | BG 800 | CE-0123CT1360   |
| BG 400  | CE-0123CT1304   | BG 950 | CE-0123CT1371   |
| BG 450  | CE-0123CT1315   |        |                 |

This declaration of conformity is issued under the sole responsibility of the manufacturer.  
The object of the declaration described above is in conformity with:

- Gas Appliance Regulation 2016/426/EU
- Machinery Directive 2006/42/EC
- EMC 2014/30/EU
- The Restriction of the Use of Certain Hazardous Substances (RoHS) Directive 2011/65/EU

References to the relevant harmonised standards used or references to the other technical specifications in relation to which conformity is declared:

**EN 676:2020** Excluding the requirements of Annex J/K.  
Automatic forced draught burners for gaseous fuels.

**Additional information can be downloaded at: [www.bentone.com](http://www.bentone.com)**

Manufacturer: Enertech AB  
Näsvägen 8  
SE-341 34 LJUNGBY  
Sweden

Notified Body: TUV SÜD Product Service GmbH  
Ridlerstraße 65  
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Notified Body Number: 0123

Ljungby, 2022-10-10

Joachim Hultqvist  
Technical Manager  
Enertech AB

Ola Karlsson  
Quality Manager  
Enertech AB

## UK Declaration of conformity

## Bentone Gas Burners

Type:

|         |        |        |        |
|---------|--------|--------|--------|
| BFG 1   | BG 300 | BG 550 | BG 800 |
| STG 120 | BG 400 | BG 650 | BG 950 |
| STG 146 | BG 450 | BG 700 |        |

This declaration of conformity is issued under the sole responsibility of the manufacturer.  
The object of the declaration described above is in conformity with:

- Gas Appliances (Enforcement) and Miscellaneous Amendment Regulations 2018
- Supply of Machinery (Safety) Regulations 2008
- Electromagnetic Compatibility Regulations 2016
- The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012

References to the relevant harmonised standards used or references to the other technical specifications in relation to which conformity is declared:

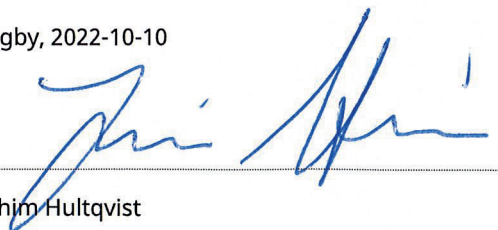
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Additional information can be downloaded at: [www.bentone.com](http://www.bentone.com)

Manufacturer: Enertech AB  
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