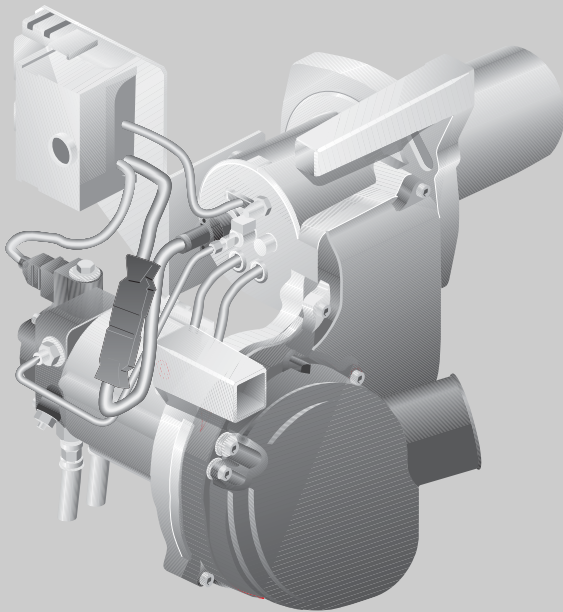


# Installation and Service Instructions

## Low Emissions Oil Burner for Condensing Boiler



**Note:** This manual must be retained for future reference.

### **CAUTION!**

Before commissioning the burner, read and follow the safety instructions in this commissioning and servicing manual.

### **WARNING!**

If installation, adjustment, modification, operation or maintenance of the heating system is carried out by an unqualified person, this may result in danger to life and limb or property damage.

The instructions given in this commissioning and servicing manual must be followed precisely. If you require assistance or further information, contact a qualified installer or an appropriate service provider.

### **CAUTION!**

This instruction manual forms part of the technical documentation that is to be handed to the heating system operator. Discuss the instruction in this manual with the owner or operator of the heating system to ensure that they are familiar with all information required for operation of the heating system.

## Logatop BE 1.3 GB and 2.3 GB

**For trained and certified installers**

**Please read carefully prior to installation, maintenance and service.**

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# 1 General information



## USER NOTE

Observe all standards and guidelines applicable to the installation and operation of the system in your country.

Country	All countries
Fuels	Domestic heating oil, ASTM D396-05 Type 2 (viscosity max. 6.0 mm <sup>2</sup> /s at 68 °F - Approved for B5 fuel oil)
Comments	The burner must be operated with the specified fuel only. The system must be cleaned and serviced once a year. The operation of the complete system must be tested at the same time. Any faults must be corrected immediately.

Tab. 1 Permitted fuel types

## 1.1 Codes and standards

### 1.1.1 Certification

BE burners are CSA listed for the U.S. and Canada, certified to comply with ANSI/UL 296 and CSA B140.2.1, for use with #2 heating oil (to ASTM D396 standard).

Burner labels list compliance, when required, with special local, state or provincial approvals.

**Notice** Install this burner in accordance with all local codes and authorities having jurisdiction. Regulations of those authorities take precedence over the general instructions provided in this manual.

### 1.1.2 United States installations

Burner/appliance installations in the United States must comply with the latest revisions of NFPA 31 (Standard for the Installation of Oil-Burning Equipment), ANSI/NFPA 70 (National Electrical Code), and all applicable local codes. **In the Commonwealth of Massachusetts, 527 CMR 31.00** requires owners of all residential properties to install and maintain carbon monoxide (CO) alarms.

### 1.1.3 Canadian installations

Burner/appliance installations in Canada must comply with the latest editions of CSA B139 (Installation Code for Oil Burning Equipment), CSA standard C22, Part 1 (Canadian Electrical Code), and all applicable local codes.

## 2 Safety

### 2.1 About these instructions

These commissioning and servicing instructions contain important information regarding the safe and proper installation, commissioning and servicing of the Logatop BE 1.3 GB/2.3 GB blue-flame burner.

These start-up and maintenance instructions are designed for specialists, who – through their vocational training and experience – are knowledgeable in handling heating systems and oil-fired installations.

The Logatop BE 1.3 GB and 2.3 GB blue-flame burners are referred to throughout this manual simply as "the burner".

Observe these instructions for your safety.

### 2.2 Intended use

The burner may only be fitted in a Logano GB125 boiler or subsequent versions of it.

The burner may only be operated when properly installed in the boiler.

The burner is fully automatic and meets the requirements of UL-296 (burners) and UL-726 (boilers).

The burner is heat-tested at the factory and preset for the specified nominal boiler output (see label on burner). This means that it is only necessary to check the burner settings at initial start-up and adjust it for the local conditions if necessary.

### 2.3 Layout of the instructions

Two levels of danger are identified and signified by the following terms:



**WARNING!**

#### **DANGER TO LIFE**

Identifies possible dangers emanating from a product, which might lead to serious injury or death if appropriate care is not taken.



**CAUTION!**

#### **RISK OF INJURY/ SYSTEM DAMAGE**

Indicates a potentially dangerous situation which could lead to minor or moderately serious injuries or damage to property.

Additional symbols for identification of dangers and user instructions:



**WARNING!**

#### **DANGER TO LIFE**

from electric shock.



#### **USER NOTE**

Tip for optimum use of equipment and adjustment as well as useful information.

## 2.4 Please observe these instructions

If so required by the appropriate supervisory authority, the heating system must comply with the Standard for Controls and Safety Devices for Automatically Fired Boilers, ANSI/ASME CSD-1.

Carbon monoxide detectors must be installed as specified by the local regulations. The boiler must be serviced annually.



### DANGER TO LIFE

from flue gas poisoning.

#### WARNING!

Insufficient ventilation may cause dangerous flue gas leaks.

- Make sure that air inlet or outlet vents are not closed off or their size reduced.
- The boiler must not be operated until the obstruction has been removed.
- Inform the system operator in writing of the problem and associated danger.



### RISK OF FIRE

due to flammable materials or liquids.

#### WARNING!

- Make sure that there are no combustible materials or liquids in the boiler room before starting work.



### RISK OF FIRE

due to improper use.

#### WARNING!

- The burner may only be operated when properly installed in the boiler.



### BURNER DAMAGE

from contaminated combustion air.

#### CAUTION!

- Prevent excessive dust levels.



### RISK OF DAMAGE TO SYSTEM

from blocked oil filters.

#### CAUTION!

Filters that become blocked immediately after filling the tank may indicate that residue on the bottom was stirred up during filling.

- In such cases it is recommended to shut down the heating system while filling the tank and wait several hours before restarting the system. Instruct the operator and building owners accordingly.



#### CAUTION!

### RISK OF DAMAGE TO SYSTEM

due to incorrect installation.

- Installation and operation of the heating system must comply with all applicable codes, regulations and statutory requirements.



#### WARNING!

### DANGER TO LIFE

from electric shock.

- Isolate the heating system from the power supply before any work on the heating system is undertaken.
- It is not sufficient just to switch off the controller.



#### CAUTION!

### DEVICE DAMAGE

due to incorrect repair.

- Do not carry out any repair work on components that perform safety functions.



### USER NOTE

- Only use original Buderus spare parts.

Buderus accepts no liability whatsoever for damage resulting from the use of spare parts not supplied by Buderus.



#### WARNING!

### DANGER TO LIFE

by failure to consider your own safety in an emergency such as a fire.

- Never put yourself at risk of fatal injury. Your own safety must always take the highest priority.



#### CAUTION!

### RISK OF DAMAGE TO SYSTEM

due to unsatisfactory cleaning and maintenance.

- Clean and service the system once a year. Check that the complete heating system operates correctly.
- Immediately correct all faults to prevent system damage.

**DANGER TO LIFE**

from electric shock.

**WARNING!**

- Only qualified electricians are permitted to carry out electrical work.
- Before opening up any device or appliance, safely switch off the power supply and isolate it completely from the mains power supply and ensure the power cannot be inadvertently reconnected.
- Please observe all installation instructions.

## 2.5 Disposal

- Dispose of packaging in an environmentally responsible manner.
- Dispose of all heating system components that have to be replaced at an authorized disposal site.

### 3 Product description

The main components of the burner are:

- Oil pump with solenoid valve and oil connection hoses (Fig. 1, **Item 1**)
- Burner motor (Fig. 1, **Item 2**)
- Burner tube (Fig. 1, **Item 3**)
- Burner controller with reset button (Fig. 1, **Item 5**)
- Flame sensor (Fig. 1, **Item 6**)
- Blower fan (Fig. 1, **Item 7**)

The burner (Fig. 1) must be properly connected to the controller (see boiler documentation) by means of a connector (7-pin burner connector).

The burner is controlled and monitored by a fully automated primary burner controller.

- After a demand for heat has been generated by the heating system control, the burner is switched on and the oil is heated to approx. 149 °F (65°C) prior to entering the nozzle. The process may take a maximum of three minutes when starting cold.
- After the oil has been heated, the fan and pump are energized, the solenoid valve is opened, and power supplied to the igniter.
- A blue flame is visible immediately after ignition.
- This combustion system vaporizes the oil using recirculation of hot gases, mixing them homogenously with the combustion air and burning them inside the burner tube.
- The flame sensor must send a flame signal before the safety period expires; otherwise the system will be switched off (see Chapter 6.8 "Carrying out safety test", page 21).

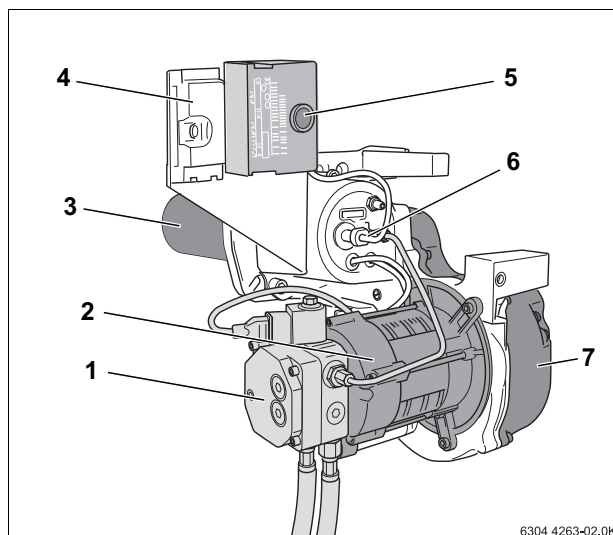


Fig. 1 Logatop BE 1.3 GB and 2.3 GB burner

**Item 1:** Oil pump with solenoid valve and oil connection hoses

**Item 2:** Burner motor

**Item 3:** Burner tube

**Item 4:** Burner connection for 7-pin burner plug connector

**Item 5:** Burner control unit with reset button

**Item 6:** Flame sensor

**Item 7:** Blower



## 4 Technical data and scope of delivery

The technical data provide information on the output profile of the burner.

### 4.1 Burner types

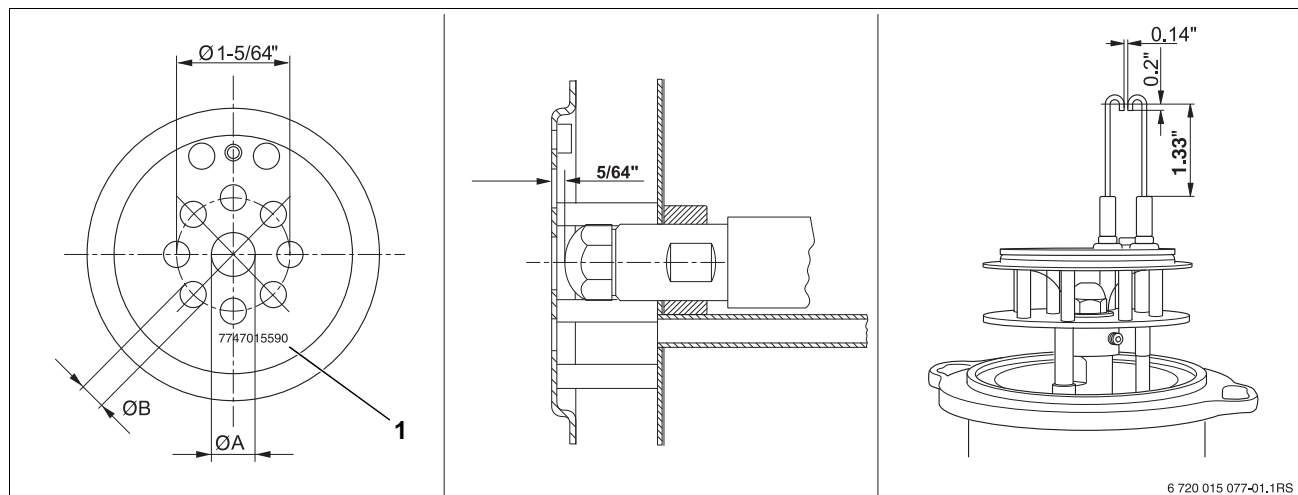


Fig. 2 Mixing system and ignition electrode (dimensions in inches)

Item 1: Stamped number

for Logano GB125 boiler			
Burner model	Stamped number	Mixing system	
		Ø A*	Ø B*
		in inches	in inches
BE 1.3 – 22 GB	7 747 010 590	15/32"	7/32"
BE 2.3 – 30 GB	7 747 009 153	15/32"	17/64"
BE 2.3 – 35 GB	7 747 009 154	31/64"	21/64"

Tab. 2 Technical data of burner types – mixing system and ignition electrode

\* Subject to a tolerance of 1/32".

## 4.2 Burner tubes

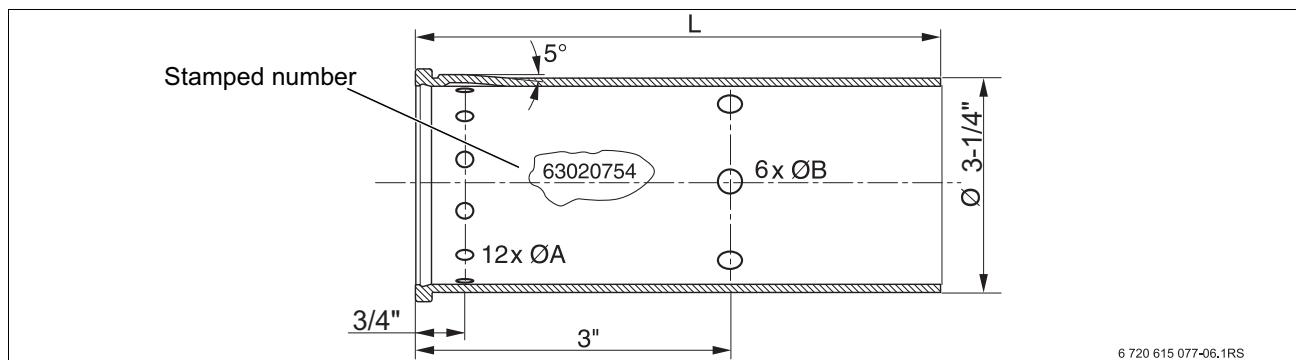


Fig. 3 Burner tube dimensions

Logatop burner	Stamped number	Burner tubes	Ø A * in inches	Ø B * in inches	L in inches
BE 1.3 - 22 GB	63020754	D83/L214/3.0/2.5	1/8"	1/8"	8-1/2"
BE 2.3 - 30 GB	63028637	D83/L224/5.9/4.8	1/4"	3/16"	8-3/4"
BE 2.3 - 35 GB	63028638	D83/L224/7.0/5.7	5/16"	1/4"	8-3/4"

Tab. 3 Ceramic burner tubes for Logano GB125 cast boilers

\* Tolerances for hole sizes are  $-1/16"$

## 4.3 Settings and nozzle installation



### USER NOTE

All details relate to an air intake temperature of 68 °F and an installation altitude of no more than 1650 feet above sea level.

Settings, nozzle specifications <sup>1</sup>		Logano GB125 (with balanced flue)		
Burner model		BE 1.3 – 22 GB	BE 2.3 – 30 GB	BE 2.3 – 35 GB
Rated output	MBtu/h	72	96	116
Mixing system (part number)		7 747 010 590	7 747 009 153	7 747 009 154
Nozzle <sup>1</sup>		Danfoss 0.45 gph 80° HFD	Danfoss 0.55 gph 60° HFD	Danfoss 0.65 gph 80° H
Oil pressure	psi	189 – 290	218 – 334	218 – 334
Oil throughput	gph	0.58	0.76	0.95
Air intake setting (estimated)		4.0	4.5	4.5
Static pressure	W. C. [inches H <sub>2</sub> O]	3.8–4.7	3.8–4.7	3.7–4.9
Combustion chamber pressure		0 – 0.20	0 – 0.21	0 – 0.34
Minimum draft (draft requirement)		0	0	0
Available draft		0.12	0.12	0.20
CO <sub>2</sub> value without hose connected	%	See Fig. 12, page 19		
CO <sub>2</sub> level with hose connected	%	See Fig. 12, page 19		
CO value	ppm	< 50	< 50	< 50

Tab. 4 Settings and nozzle specifications for Logano GB125 cast boiler for balanced-flue operation

<sup>1</sup> Never use nozzles other than those specified here.

#### 4.4 Automated burner controller LMO

LMO		
Supply voltage	V, AC	120
Frequency	Hz	60
External back-up fuse (Si), slow-blow	A	6.3
Power consumption	Watts	12
Weight	lbs	approx. 0.5
Degree of protection, in installed condition		IP 40

Tab. 5 LMO technical data

#### 4.5 Package Contents

- Check that the packaging is undamaged on delivery.
- Check that the delivery is complete.



##### USER NOTE

The burner is supplied as a complete unit with the Logano GB125 boiler, the burner door, the outer casing panels and sound-insulation cover.

## 5 Conducting service work on the LMO burner controller

The burner controller starts up and monitors the burner at all times.

In this burner the flame is monitored by a blue-flame sensor. The burner controller receives a heat demand from the heating system.

If a fault occurs, the reset button (Fig. 4, **Item 1**) allows troubleshooting (see Chapter 5.3 "Repairing faults in the burner controller", page 14).



### DANGER TO LIFE

from electric shock.

#### WARNING!

- Do not open the burner control unit and never attempt repair or modifications.
- Never operate the LMO after it was dropped or has taken a hit, because the safety functions may be affected even if there is no visible damage.

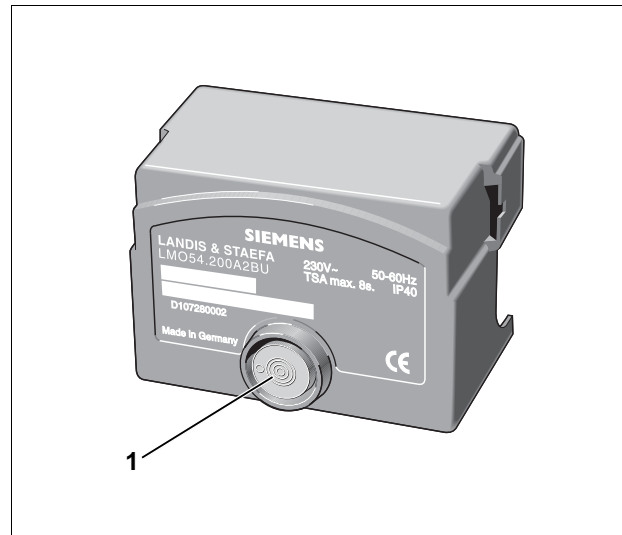


Fig. 4 LMO burner control unit

**Item 1:** Reset button

### 5.1 Program sequence

#### Legend:

- R** : Temperature and pressure control  
**W** : Temperature and pressure monitor  
**SB** : Safety cut-out  
**OH** : Oil preheater.  
**OW** : Enabling switch for oil preheater  
**M** : Burner motor  
**BV1** : Solenoid valve 1  
**Z** : Ignition transformer  
**FS** : Flame signal  
**LED** : 3-color indicator light  
**tw** : Wait time  
**t1'** : Purge  
**t1** : Pre-purge  
**t3** : Pre-ignition period  
**t3n** : Post-ignition period  
**TSA** : Startup safety period  
**A'** : Startup for burners with "OH"  
**A** : Startup for burners without "OH"  
**B** : Ignition  
**C** : Burner in operation  
**D** : Normal shutdown by "R"

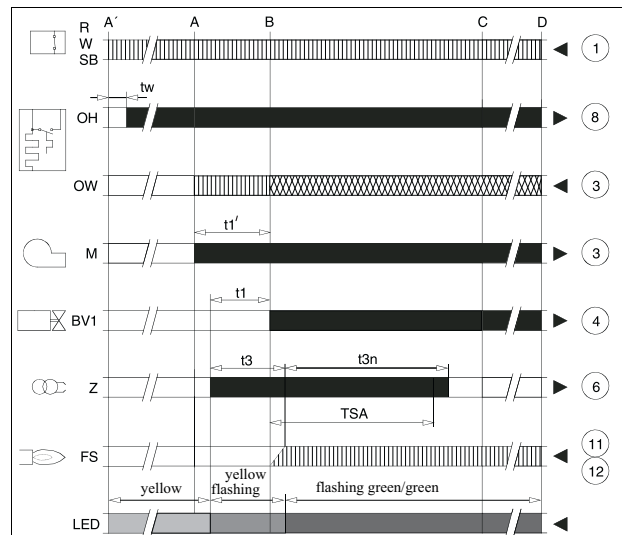


Fig. 5 Burner control unit program sequence

- = Control signals  
 ▤ = Required input signals  
 ▨ = Permissible input signals



### 5.3 Repairing faults in the burner controller

Following shutdown due to a fault, the LED on the burner control unit shows red. The faults can be read by a flash code.

Proceed as follows:

- Press and hold the reset button for approx. five seconds until the LED briefly flashes yellow.
- Observe the flash code and determine the cause of the fault from the table below (Tab. 7).
- Rectify the fault.
- Press and hold the reset button for approx. one second to cancel diagnosis and re-enable the burner.

Flash code	Possible cause	Remedy
2 flashes	no flame established during safety time	Rectify faults (see Chapter 10 "Troubleshooting burner faults", page 40)
4 flashes	Stray light at burner start	
7 flashes	flame goes out during operation	
8 flashes	oil preheater time monitoring	First check electrical connections. If necessary replace oil preheater.
10 flashes	internal error Wiring fault	Reset burner controller (Press reset button for one second). If necessary, replace burner controller.
LED "flickers"	Interface mode is active	Activate interface diagnosis by pressing and holding the reset button (> five seconds). If you activate the interface diagnosis by mistake (LED flickers pale red), you can cancel it by pressing the reset button again (> five seconds). The LED signals the correct switching time by a yellow light pulse.

Tab. 7 Diagnosing faults



#### USER NOTE

The control outputs are without power and the burner remains switched off while diagnosing the fault.

## 6 Initial burner start-up

This chapter describes how to start the burner for the first time. The burner has been factory-fired, and set up at the factory for room air independent operation. Verify if the factory settings are acceptable for installation, and only adjust if required due to system specification.

- Then complete the inspection log (see Chapter 6.9 "Commissioning log", page 22).



### NOTICE

For safety reasons the burner is supplied in "lock out status".

### 6.1 Checking electrical plug connections

- Check that all electrical plug connections are correctly installed.

### 6.2 Burner air supply connection

The flexible hose is connected to the air intake in the blower housing.

- Attach the flexible hose using the supplied hose clamp.

### 6.3 Checking and connecting the oil lines

Before connecting the oil supply to the burner, check that all oil lines and the oil filter are clean and tight.

- Inspect the oil line and clean or replace it if necessary.
- Check oil filter, replace if previously used.
- Check the oil supply system (see Chapter 9 "Laying out oil supply system", page 36).
- Connect the burner oil hoses to a Tigerloop (supplied). For installation instructions see GB125 Installation Manual page 26.



### USER NOTE

Be careful not to reverse the suction and return lines (Fig. 6).

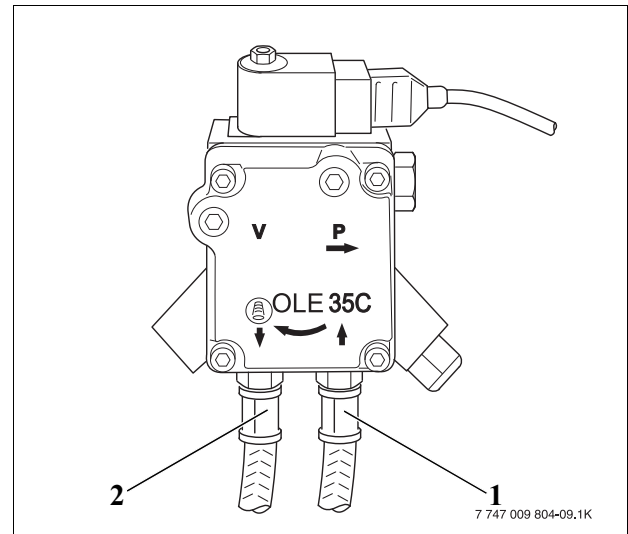


Fig. 6 Oil pump – Suntec

**Item 1:** Oil suction line (red stripe)

**Item 2:** Return line (blue stripe)

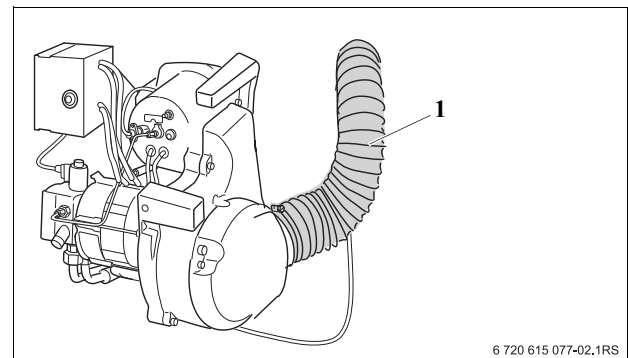


Fig. 7 Connection of corrugated hose to burner

**Item 1:** Corrugated hose (air supply for combustion)

## 6.4 Bleeding oil line

To ensure the burner operates safely and reliably you must check the oil supply system (see Chapter 9 "Laying out oil supply system", page 36). Check the suction resistance and check for leaks, particularly in older systems.

There are two methods for bleeding the oil line:

- oil suction pump – this will prevent damage to the oil pump caused by operation without oil.
- using the burner tester (Fig. 9, **Item 1**; available separately) – if the oil is to be drawn in by the oil pump attached to the burner.

The procedure for bleeding the oil line using the burner tester (Fig. 9, **Item 1**) is described below. The burner tester is available separately as an accessory.

- Disconnect all electrical power to your heating system.
- Remove the burner control unit (Fig. 8, **Item 2**) from its base.
- Fit burner tester (Fig. 9, **Item 1**) onto burner control unit base.
- Switch ON the heating system.
- Switch on the controller ON/OFF switch. The LED (red) will light up (Fig. 9, **Item 2**).
- Switch on the burner tester using the ON/OFF switch (Fig. 9, **Item 5**). Both LEDs (red and green) will light up (Fig. 9, **Item 2** and **3**).
- Switch on the switch for bypassing the oil preheater (Fig. 9, **Item 4**).



### RISK OF DAMAGE TO SYSTEM

from defective oil pump.

#### CAUTION!

- Never run the pump without oil longer than five minutes.

- Check that the oil drawn in is free of air bubbles by observing the glass dome of the Tigerloop (Fig. 8, **Item 4**).

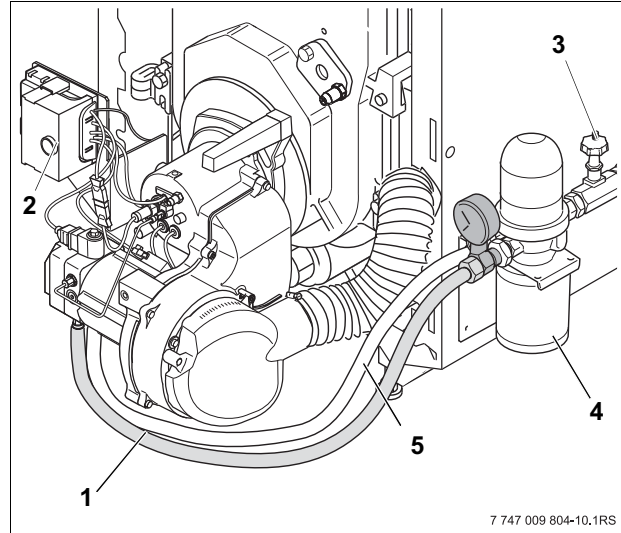


Fig. 8 Oil filter

- Item 1:** Oil suction line  
**Item 2:** Burner controller  
**Item 3:** Oil shutoff valve  
**Item 4:** Tigerloop  
**Item 5:** Oil return line

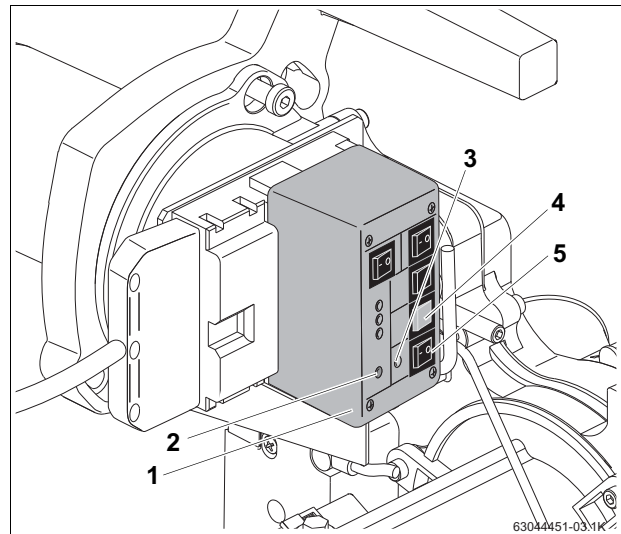


Fig. 9 Bleeding oil line with burner tester

- Item 1:** Burner tester (available separately)  
**Item 2:** LED (red)  
**Item 3:** LED (green)  
**Item 4:** Switch for engaging the oil preheater  
**Item 5:** Burner tester switch



**CAUTION!****RISK OF DAMAGE TO SYSTEM**

through too frequent reset.

If the burner is reset more than three times in quick succession (within three minutes) if it does not ignite, the burner ignition transformer may be damaged.

- Bleed the system with the aid of the built-in oil pump, not by repeatedly pressing the reset button (Fig. 10, **Item 1**).

## 6.5 Starting the burner

- Open the oil shutoff valve (Fig. 8, **Item 3**, page 16) on the oil filter.
- Turn on electric power to the heating system and boiler.
- Generate a heat demand on the controls.

**USER NOTE**

The burner is in fault setting when delivered (the reset button LED is permanently red). The burner must be reset.

- Press and hold the reset button (Fig. 10, **Item 1**) for longer than one second (switch on). After approx. five seconds, the burner enters startup/running mode (see Tab. 6, "Display of burner operating status by multicolor LED", page 13).

**USER NOTE**

Before every start (switch-on) the automatic igniter runs through a self-test (about five seconds).

- Check oil connections for leaks.

**If the burner does not start:**

- Press the reset button (Fig. 10, **Item 1**).

If the burner still does not start after pressing the reset button several times, you must establish the cause with the aid of the troubleshooting flow chart (see Chapter 10.1 "Troubleshooting flow chart", page 40).

## 6.6 Tighten burner door retaining screws

The screws fastening the burner door must be tightened hand-tight (approx. 8 ft. lbs) with a tool when hot to prevent excess air from entering the combustion chamber.

- Tightening burner door retaining screws

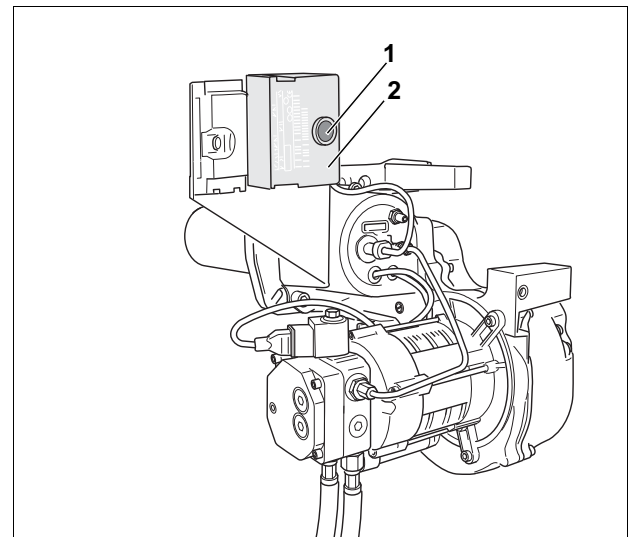


Fig. 10 Reset button and indicator light

**Item 1:** Reset button

**Item 2:** Automatic burner controller

## 6.7 Recording and adjusting measured values

The readings must always be taken from the flue pipe (Fig. 11, **Item 3**) or the flue/air pipe socket (Fig. 11, **Item 2**).

### 6.7.1 Recording measured values

The boiler water temperature has a significant influence on the flue gas temperature. Therefore, if possible you should take the readings at a boiler water temperature of at least 140 °F and after the burner has been running for approx. 20 minutes.



#### USER NOTE

We recommend checking the factory settings and not changing them when they conform to the technical data.

Since the combustion air supply is drawn directly from outside, there are large differences between summer and winter. Therefore, you must set the CO<sub>2</sub> level according to the prevailing air supply temperature at the time of commissioning.

### 6.7.2 Establishing the CO<sub>2</sub> content with balanced-flue systems

- Insert the testing probe into the air supply socket testing point (Fig. 11, **Item 2**) and measure the air supply temperature.
- Insert the testing probe into the flue socket testing point (Fig. 11, **Item 4**) so as to reach into the center of the gas flow (center of the flue pipe – highest flue gas temperature) and measure the CO<sub>2</sub> content.
- Read off the settings from Fig. 12.

Example: at an air supply temperature of +117 °F, the burner should be set to a CO<sub>2</sub> content of 14.1 % ±0.2 %.

- Record the readings taken in the commissioning log (see Chapter 6.9 "Commissioning log", page 22).
- Close all measurement openings on completion of measurements.

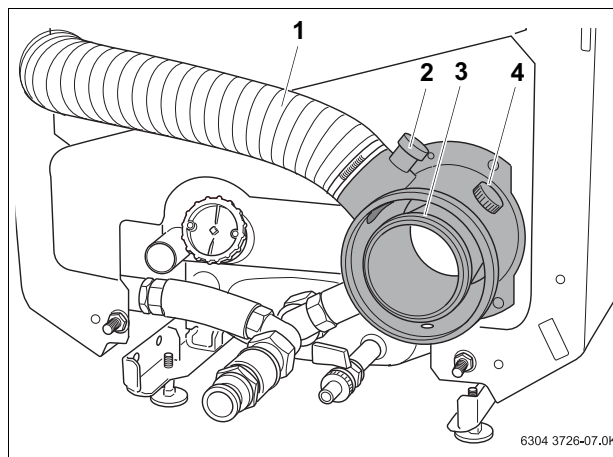


Fig. 11 Fitting the flue/air pipe socket

**Item 1:** Combustion air hose

**Item 2:** Air supply testing point

**Item 3:** Concentric flue/air pipe socket

**Item 4:** Flue gas testing point

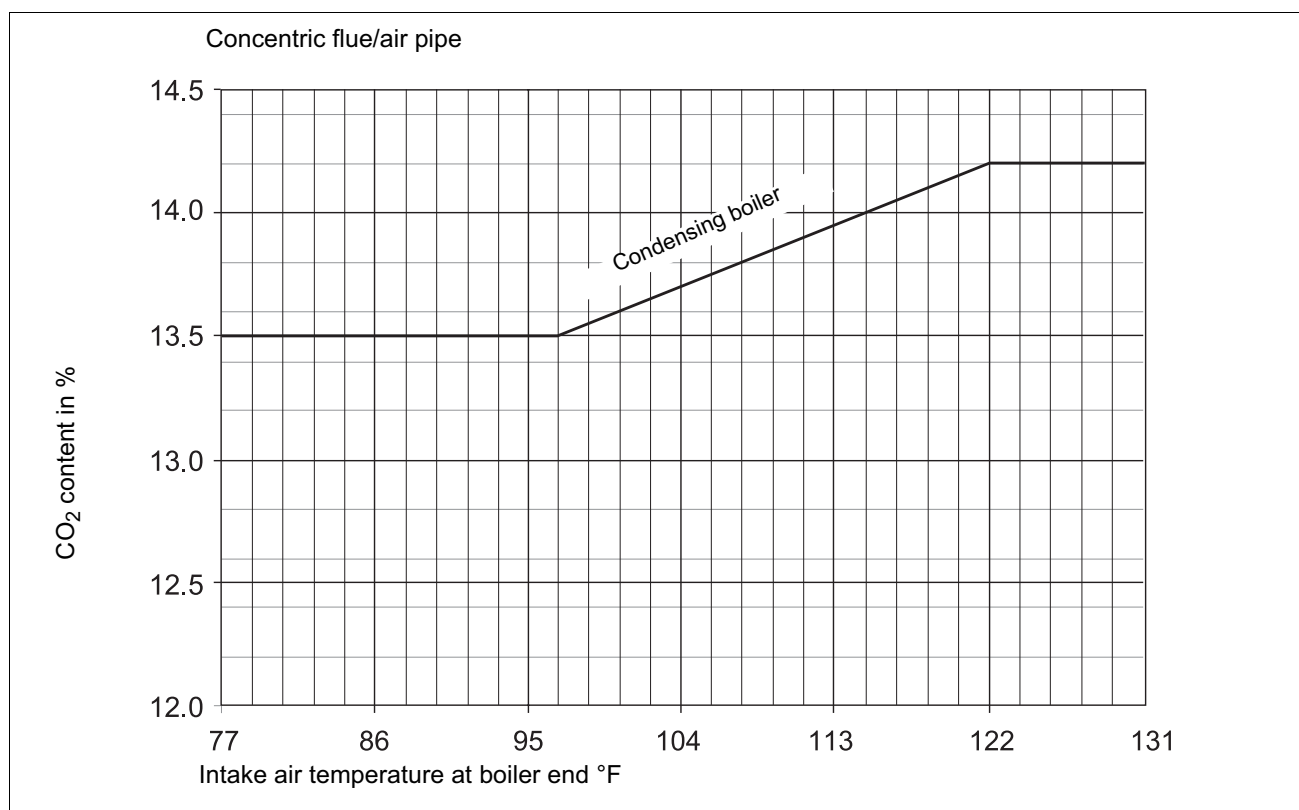


Fig. 12 CO<sub>2</sub> setting for condensing/low-temperature boilers is dependent on intake air temperature if air supply drawn through a concentric flue/air pipe (applies with and without burner cover)

### 6.7.3 Adjusting CO<sub>2</sub> value

#### Adjusting the oil pump pressure

Slightly turning the pressure adjusting screw (Fig. 13, **Item 1**) changes the oil pump pressure and, therefore, the CO<sub>2</sub> content.

- Screw oil pressure gauge into the connection on the oil pump (labeled as P).

#### To increase pressure:

Rotate clockwise



= Increasing CO<sub>2</sub> content

#### To reduce pressure:

Rotate counter-clockwise



= Reducing CO<sub>2</sub> content

If the required CO<sub>2</sub> content is not obtained within the limits of oil pressure adjustment, you must check the gas-tightness of the combustion chamber (see Chapter 8.2 "Checking gaskets of boiler and venting system", page 35).

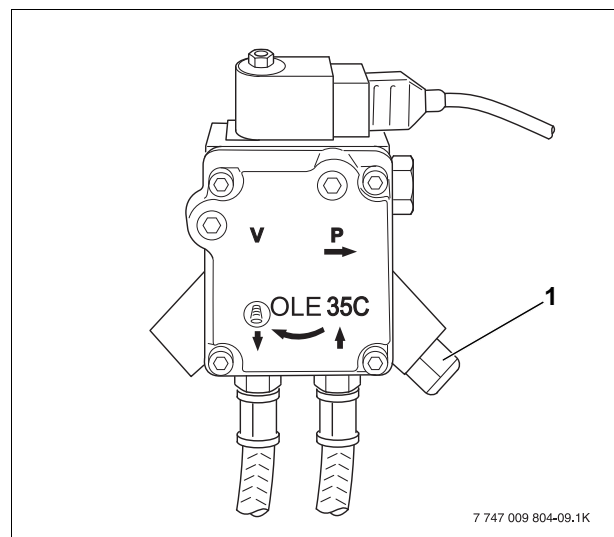


Fig. 13 Setting pressure – Suntec oil pump

### Adjusting the air supply

If the CO<sub>2</sub> content cannot be adjusted by changing the oil pressure alone (oil pressure outside the adjustment range), the air volume must also be changed by adjusting the air intake shutter.

- Loosen the screw on the blower housing (Fig. 14, **Item 1**).
- Slowly adjust static blower pressure by the air intake shutter.
- Adjust the oil pressure (see Section "Adjusting the oil pump pressure") so that the CO<sub>2</sub> value is within the required range. Replace nozzle if necessary.



#### USER NOTE

Lower numbers on the scale equal a higher air pressure as shown by the arrow in Fig. 14.

Scale	Air volume	CO <sub>2</sub> content
0	maximum	minimum
6	minimum	maximum

Tab. 8 Setting the air volume

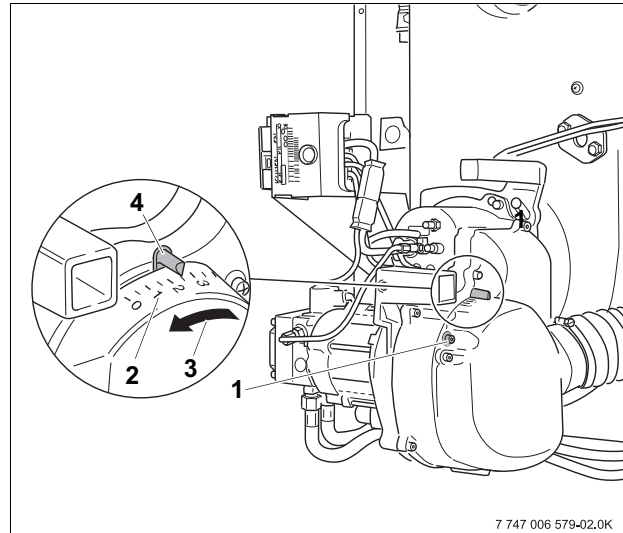


Fig. 14 Adjusting the air intake pipe

**Item 1:** Screw

**Item 2:** Scale

**Item 3:** Arrow on air intake housing

**Item 4:** Lever for adjusting the air intake

### 6.7.4 Measure CO content (carbon monoxide)

The CO content (carbon monoxide content) should be less than 50 ppm (CO < 50 ppm).

- If the reading differs from the specified level: identify and correct the fault (see Chapter 10 "Troubleshooting burner faults", page 40).



#### USER NOTE

If the CO reading is too high when the burner is first commissioned, this can be caused by vapors released by organic matter (e.g. from the door insulation).

- Therefore, do not take the CO reading until the burner has been running for at least 20 - 30 minutes.

### 6.7.5 Run smoke test

The soot index must be "0" (smoke = 0).

- If the reading differs from the specified level – identify and correct the fault (see Chapter 10 "Troubleshooting burner faults", page 40).

## 6.8 Carrying out safety test

- While the burner is running, pull the flame sensor out of its holder using the handle provided (Fig. 15, **Item 3**).
- Point the flame sensor towards the light (Fig. 15, **Item 1**). It must shut off immediately, then lock out after restarting.
- Insert flame sensor again after the shutoff.
- After waiting for approx. 30 seconds, reset the burner control unit by pressing the reset button (Fig. 15, **Item 2**).
- Carry out the startup sequence (see Chapter 6.5 "Starting the burner", page 17).

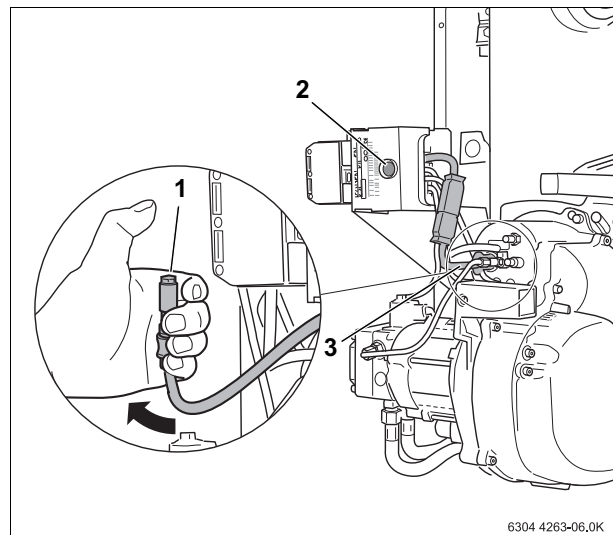


Fig. 15 Check function of flame sensor

**Item 1:** Flame sensor

**Item 2:** Reset button

**Item 3:** Handle on flame sensor

## 6.9 Commissioning log

- Fill out inspection log in detail during the start-up procedure.
- Close all measurement openings on completion of measurements.

Commissioning operations		Insert remarks or measured values
1. Checking electrical plug connections	page 15	<input type="checkbox"/>
2. Checking and connecting the oil lines	page 15	<input type="checkbox"/>
3. Bleeding oil line	page 16	<input type="checkbox"/>
4. Starting the burner	page 17	<input type="checkbox"/>
5. Tighten burner door retaining screws	page 17	<input type="checkbox"/>
6. Recording and adjusting measured values	page 18	<input type="checkbox"/>
d) Measure CO <sub>2</sub> (carbon dioxide) content	page 18	_____ %
e) measure CO content (carbon monoxide)	page 20	_____ ppm
f) Measure chimney draft	page 20	_____ W.C. [inches H <sub>2</sub> O]
7. Run smoke test	page 20	_____ smoke
8. Carrying out safety test	page 21	<input type="checkbox"/>
9. Informing the end user and handing over technical documentation		<input type="checkbox"/>
10. Confirmation of properly completed commissioning		<input type="checkbox"/>
Company stamp/signature/date		

## 7 Burner service and maintenance

This chapter describes how to service and maintain the burner.

- Complete the inspection and servicing log (see Chapter 7.11 "Inspections and maintenance protocol", page 32).

The values during operation must be measured at the start of inspection or maintenance. The heating system must be shut down for the following inspection and maintenance work.



### USER NOTE

Spare parts can be ordered from your Buderus wholesaler.

### 7.1 Recording and correcting measured values

Record the readings taken as per Item 1 of the servicing protocol.

The boiler water temperature has a significant influence on the exhaust temperature. Therefore, if possible you should take the readings at a boiler water temperature of approx. 140 °F and after the burner has been running for more than twenty minutes.

- Insert the testing probe (Fig. 16, **Item 1**) so as to reach into the center of the gas flow (center of the flue pipe – highest flue gas temperature).
- Take the readings and record them in the commissioning protocol (see Chapter 6.9 "Commissioning log", page 22).
- If the readings differ from the required levels, readjust the burner (see Chapter 6.7 "Recording and adjusting measured values", page 18).
- Close all measurement openings on completion of measurements.

### 7.2 Inspection of the burner cover and burner

- Inspect the burner cover and burner for exterior contamination and damage.
- Look for dust, corrosion, defective oil lines or power cables and defective cover or panels.

### 7.3 Checking burner motor operation

- Check function of burner motor and check for operating noise

If you hear operating noise, this indicates damaged bearings.

- Replace burner motor.

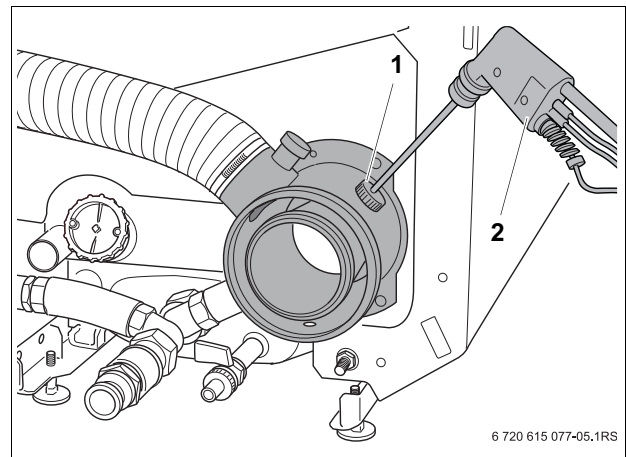


Fig. 16 Recording measured values

**Item 1:** Flue gas testing point

**Item 2:** Probe

## 7.4 Shutting off the burner

- Close oil valve in front of oil filter.
- Disconnect all electrical power to your heating system by shutting off the emergency shut-off switch or disengaging the heating system circuit breaker.
- Remove burner cover.
- Disconnect burner connector.

## 7.5 Clean oil pump filter

- Undo the four Allen screws (Fig. 17, **Item 1**).
- Remove the pump cover (Fig. 17, **Item 2**).
- Remove the oil pump filter (Fig. 17, **Item 3**).
- Check the gasket (Fig. 17, **Item 4**) for damage and replace if necessary.
- Clean the oil pump filter (Fig. 17, **Item 3**) with gasoline. Replace if excessive residue remains or filter shows signs of damage, then reassemble oil pump.

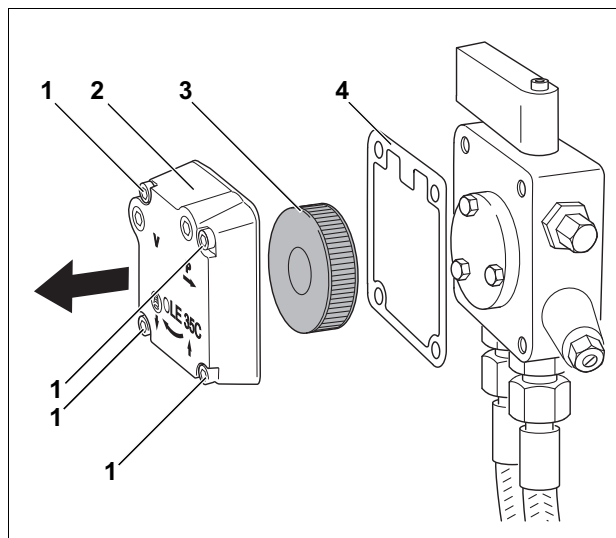


Fig. 17 Checking oil pump filter – Suntec oil pump

**Item 1:** Allen screws (four units)

**Item 2:** Pump cover

**Item 3:** Oil pump filter

**Item 4:** Gasket



## 7.6 Checking fan for dirt and damage

Procedure for inspecting the fan:

### Removing the air intake silencer

- Undo the hose clamp (Fig. 18, **Item 1**) on the air supply hose.
- Disconnect the air supply hose.
- Undo the screws (Fig. 18, **arrows**) and remove the air intake silencer (Fig. 18, **Item 2**).

### Removing the fan cover

- Undo the six screws (Fig. 19, **arrows**) and remove the fan cover.

#### 7.6.1 In case of minor dirt

- Clean fan with a brush.

#### 7.6.2 In case of severe dirt

- Undo fan impeller (Fig. 20, **Item 1**) with an Allen key (Fig. 20, **Item 2**) and pull it off the shaft.
- Clean with standard cleaning agent.
- Refit fan impeller (Fig. 20, **Item 1**).



#### NOTICE

The screw must face the flat spot on the spindle. The distance between back side of blower wheel and motor housing must be about 1/64". Ensure that the wheel is spinning freely.

- Refit fan cover (Fig. 19), air intake silencer (Fig. 18, **Item 2**) and hose.



CAUTION!

#### RISK OF INJURY

- Operate the burner with the intake silencer installed only.

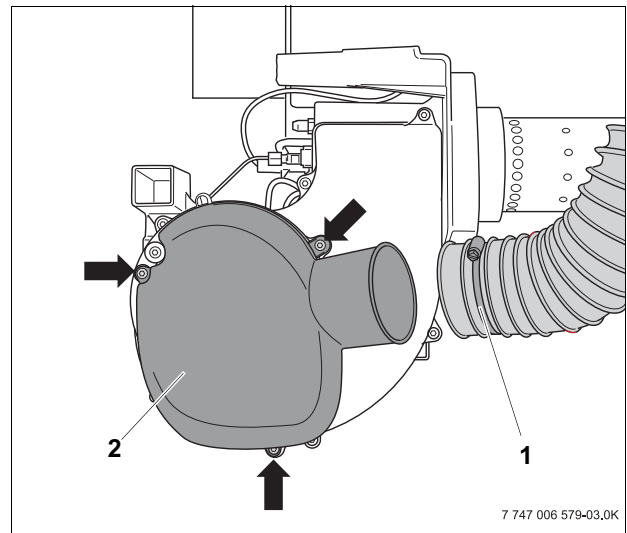


Fig. 18 Remove intake silencer

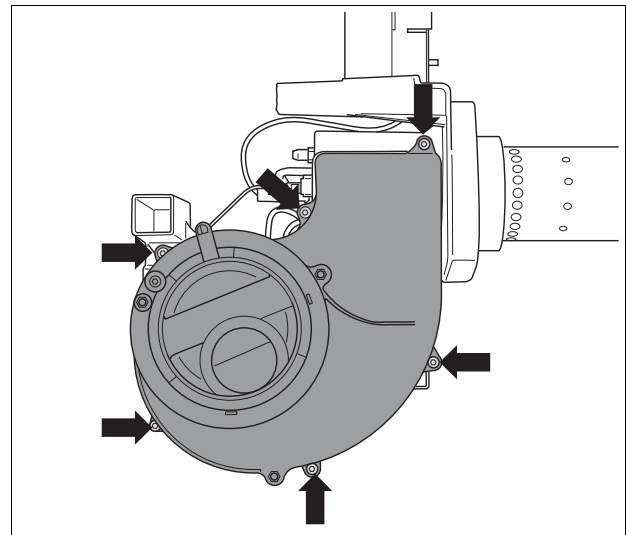


Fig. 19 Remove fan cover

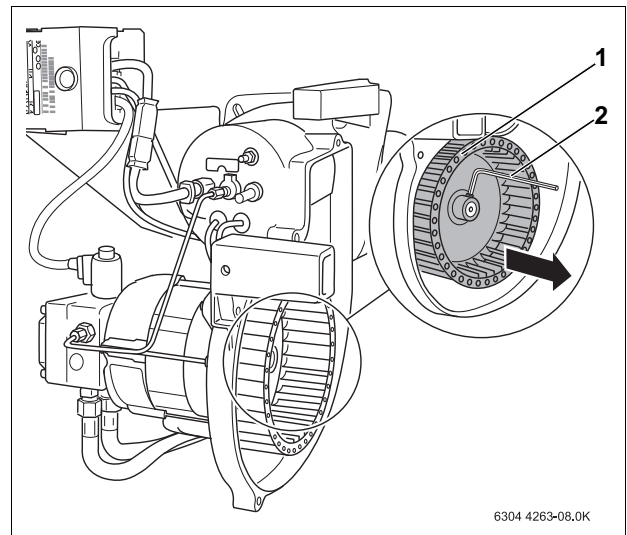


Fig. 20 Check fan, clean if necessary

## 7.7 Checking ignition electrode, mixing system, seal, nozzle and burner tube

- Loosen the two main burner service bolts (Fig. 21, arrows).



### NOTICE

Servicing the burner is simplified when bringing it into the Service Position. To remove loosen the 2 bayonet screws 5-6 turns, then turn and remove the burner from the catches (Fig. 21).

- Bring the burner in servicing position (Fig. 22).

### 7.7.1 Check ignition electrode, replace if necessary

The ignition electrodes (Fig. 22, **Item 1**) should be free of deposits.

- It is essential that the electrode and gap dimensions are as specified (see Chapter 4 "Technical data and scope of delivery", page 9); if necessary clean or replace ignition electrode.

To replace the ignition electrodes, proceed as follows:

- Loosen and remove the screw (Fig. 23, **Item 1**) between the ignition electrodes.
- Disconnect the ignition leads (Fig. 23, **Item 4**).
- Remove the ignition electrodes (Fig. 23, **Item 5**).



### RISK OF DAMAGE TO SYSTEM

through faulty ignition wire.

#### CAUTION!

- Do not disconnect or pull the ignition wires with pliers.

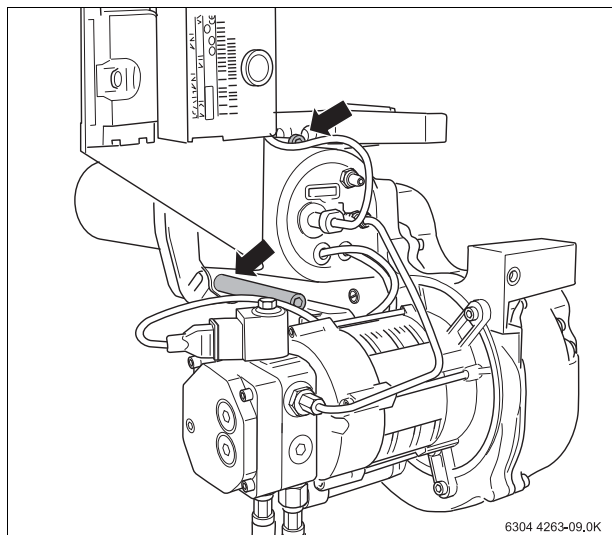


Fig. 21 Unscrew the bayonet catch screws

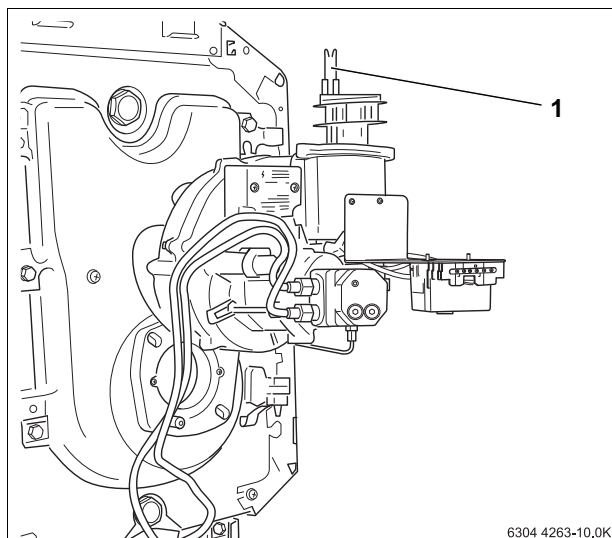


Fig. 22 Connect burner in service position

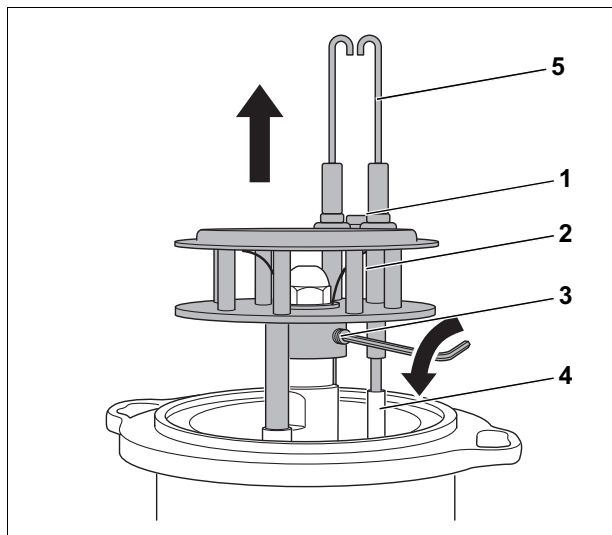


Fig. 23 Disassembling mixing system

### 7.7.2 Check mixing system, replace if necessary

A slight black residue on the mixing system is normal and does not affect its function. If the residue is heavier, the mixing system must be cleaned or replaced. Note the identification code (see Chapter 4 "Technical data and scope of delivery", page 9).

- Undo the set screw (Fig. 23, **Item 3**) and pull the mixing system (Fig. 23, **Item 2**) upward to remove.

### 7.7.3 Replacing nozzle



#### NOTICE

- The oil nozzle must be replaced as part of the annual service. Use the correct nozzle as specified (see Chapter 4 "Technical data and scope of delivery", page 9).

- Loosen and remove the nozzle (Fig. 24, **Item 1**) using two wrenches, sizes 16 mm and 19 mm, and remove.



#### USER NOTE

If you find that the shutoff valve is defective, replace it (see Chapter 7.7.4 "Check the shutoff valve on the oil preheater, replace if necessary", page 28).

- Install new nozzle.
- Reassemble the mixing system (Fig. 25, **Item 3**).
- Correctly attach the ignition leads (Fig. 25, **Item 4**).
- Slide flame sensor tube (Fig. 25, **Item 2**) into the guide tube (Fig. 25, **Item 1**).



#### USER NOTE

- Before fixing the mixing system in place, turn it so that the viewing tube and the locating tube are in line.

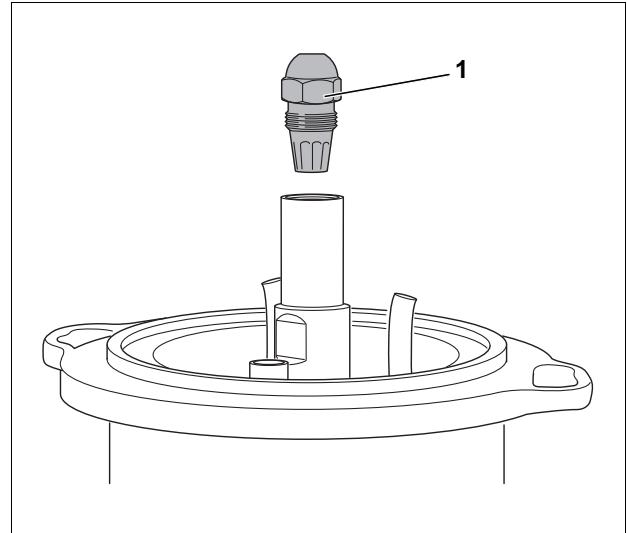


Fig. 24 Removing nozzle

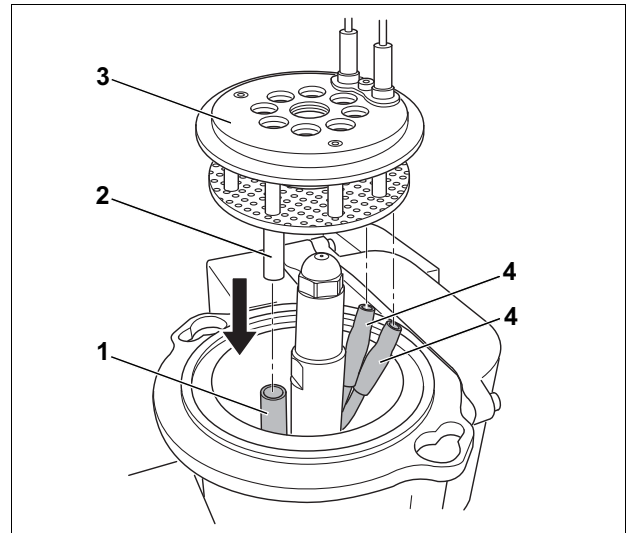


Fig. 25 Installing mixing system

**Item 1:** Guide

**Item 2:** Flame sensor tube

**Item 3:** Mixing system

**Item 4:** Ignition cables

### 7.7.4 Check the shutoff valve on the oil preheater, replace if necessary

The shutoff valve (Fig. 26, **Item 3**) in the oil preheater works like a after-drip preventer. The oil pump forces the oil through the shutoff valve when it is operating. When the pump switches off, the shutoff valve is closed by the force of the spring (Fig. 26, **Item 1**).

If there is oil on the burner screen, the shutoff valve may be faulty. Replace the shutoff valve in this case.

- Remove the nozzle (Fig. 24, page 27).
- Screw in the M5x50 bolt (Fig. 26, **Item 2**) and pull out the shutoff valve (Fig. 26, **Item 3**).
- Remove the screw and screw it into the new shutoff valve.
- Press shutoff valve with screw and remove screw.
- Install nozzle.

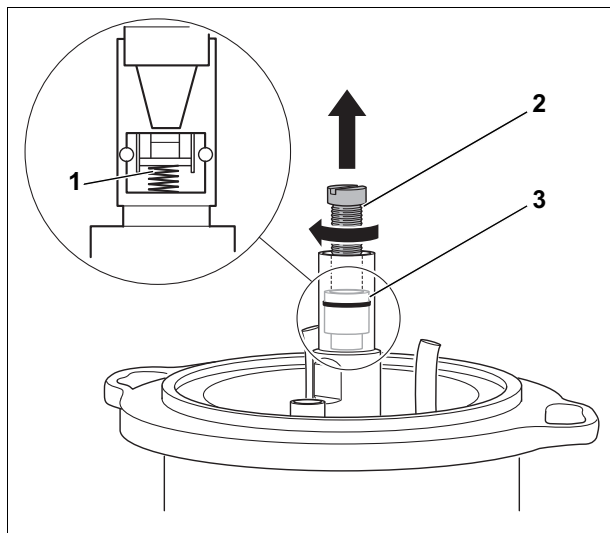


Fig. 26 Replacing shutoff valve

**Item 1:** Shutoff valve spring

**Item 2:** Bolt (M5 × 50) (in mm)

**Item 3:** Shutoff valve

### 7.7.5 Check burner tube, replace if necessary

- Open burner door.
- Inspect burner tube. Clean burner tube carefully, replace if necessary

#### Replacing burner tube

- Pull old burner tube out of support collar.



#### USER NOTE

Insert the ceramic burner tube carefully. It is fragile and may break if hit or knocked.

- Note the part number of the existing burner tube and replace with the proper model. Refer also to technical data (see Chapter 4.2 "Burner tubes", page 10).
- Place the new burner tube into the locking collar (Fig. 27, **Item 5**). Slide the burner tube past the lip (Fig. 27, **Item 2**) and engage the tube with the locking collar. The lip of the burner tube must point downward and be engaged (Fig. 27, detail).
- Use a new burner tube gasket (Fig. 27, **Item 6**).

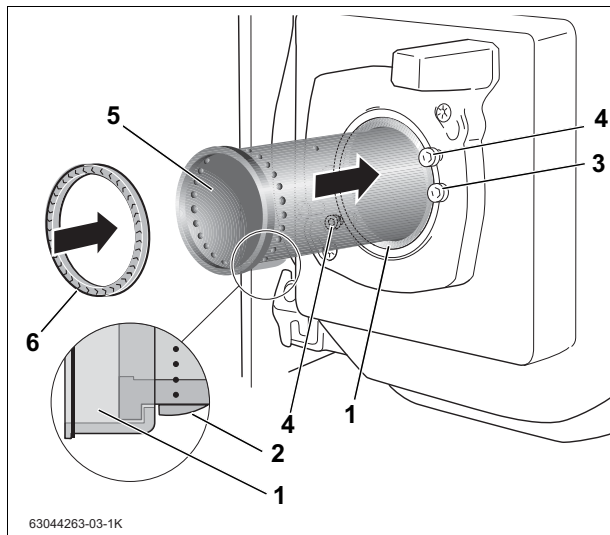


Fig. 27 Replacing burner tube

**Item 1:** Locking collar

**Item 2:** Lip

**Item 3:** Retaining screws for locking collar

**Item 4:** Burner service bolt

**Item 5:** Burner tube

**Item 6:** Gasket

### 7.7.6 Installing burner and checking gasket

- Always replace the gasket (Fig. 27, page 28) between the mixing system and the burner tube when reinstalling the burner. It is not reusable.



#### NOTICE

New gaskets ensure trouble free operation and proper flue gas values.

- Insert gasket (Fig. 27, page 28) into burner tube.
- Position burner on the two bolts in the burner flange (Fig. 27, page 28).
- Insert mixing system in the burner tube.
- Turn counter-clockwise as far as the stop and re-tighten the fixing screws (Fig. 27, page 28).

When the burner is fastened in place, the correct installation of the mixing system must be checked.

- Pull out the oil supply line (Fig. 28, **Item 1**) approx. 1/4".



#### USER NOTE

The mixing system must return to its original position by spring pressure. If it does not, the burner will likely pull in excess air which will cause improper operation.

- With the burner door (Fig. 29, **Item 1**) open, check that the gasket (Fig. 29, **Item 2**) is properly seated.

### 7.8 Tightening burner door bolt

- Close the burner door (Fig. 29, **Item 1**) and tighten the burner door bolts (to approx. 35 ft. lbs).



#### USER NOTE

Retighten the door bolt after the boiler reaches operating temperature.

### 7.9 Checking that electrical connections are tight

- Reconnect electrical wiring.
- Check that all electrical connections are correctly installed.

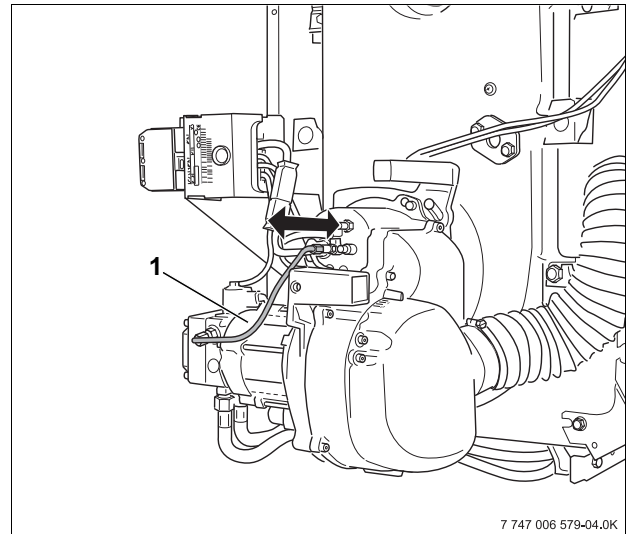


Fig. 28 Check that the mixing system is correctly installed

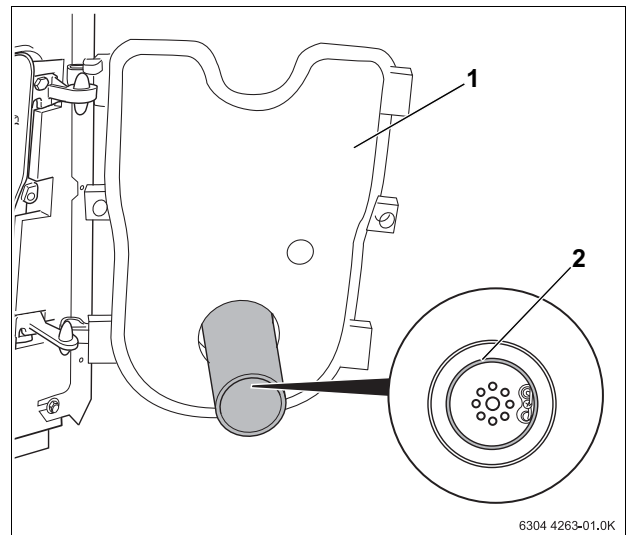


Fig. 29 Checking correct installation of gasket

## 7.10 Performing the safety check

- Start up the burner (see Chapter 6.5 "Starting the burner", page 17).
- While the burner is running, pull the flame sensor out by the handle (Fig. 30, **Item 3**).
- Point the flame sensor towards the light (Fig. 30, **Item 1**). It must shut off immediately and lock out after restarting.
- Clean the flame sensor with a soft cloth.
- Insert flame sensor again after the shutoff.
- After waiting for approx. 30 seconds, reset the burner controller by pressing the reset button (Fig. 30, **Item 2**).
- Check that the flame is visible through the flame sensor window, clean if necessary.

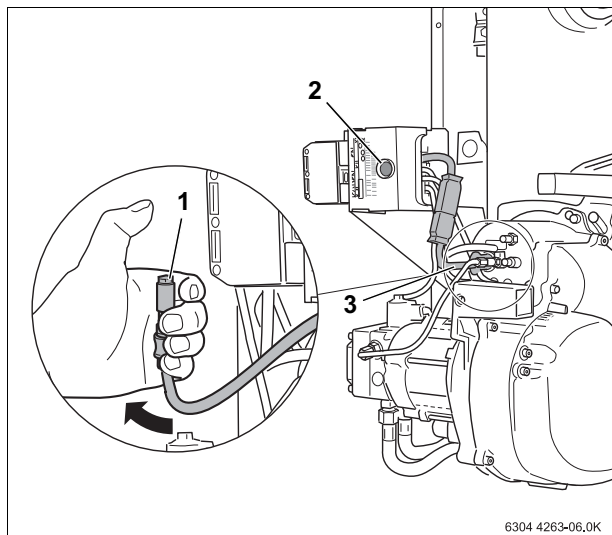


Fig. 30 Checking function of flame sensor

**Item 1:** Flame sensor

**Item 2:** Reset button

**Item 3:** Handle on flame sensor



## 7.11 Inspections and maintenance protocol

The inspection and maintenance log gives you an overview of inspection and maintenance work as it comes due.

Complete the protocol during inspection and maintenance.

- Work through listed inspection and maintenance, sign the log and enter the date.

Inspections and maintenance work		before	after	before	after
1. Recording and correcting measured values	page 23	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
a) total exhaust temperature	page 23	____ °F	____ °F	____ °F	____ °F
b) Measure air temperature	page 23	____ °F	____ °F	____ °F	____ °F
c) exhaust gas temperature net (exhaust gas temp. total – air temp.)	page 23	____ °F	____ °F	____ °F	____ °F
d) measure CO <sub>2</sub> content (carbon dioxide)	page 23	____ %	____ %	____ %	____ %
e) measure CO content (carbon monoxide)	page 23	____ ppm	____ ppm	____ ppm	____ ppm
f) Measure chimney draft	page 20	____	____	____	____
h) Conduct smoke test	page 20	____ #	____ #	____ #	____ #
2. Inspection of the burner cover and burner	page 23	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Checking burner motor operation	page 23	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Shutting off the burner	page 24	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Clean oil pump filter	page 24	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Check the shutoff valve on the oil preheater, replace if necessary	page 28	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Checking fan for dirt and damage	page 25	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Checking ignition electrode, mixing system, seal, nozzle and burner tube	page 26	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Tightening burner door bolt	page 29	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Checking that electrical connections are tight	page 29	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Starting the burner	page 17	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Tighten burner door retaining screws	page 29	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Recording and correcting measured values or adjust burner	page 23	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. Performing the safety check	page 30	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Confirmation of properly completed servicing		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		Company stamp/ signature/date		Company stamp/ signature/date	





## 8 Carrying out additional work

### 8.1 Measuring sensor current

This test allows verifying the quality of the flame sensor signal.

Check the sensor current using a multi-meter with micro-amp measuring capability. You will also need the QRC adapter (part no. 5885592), which is available as an accessory (Fig. 31, **Item 2**). An unstable flame signal (sensor current,  $45 \mu\text{A}$ ) is also identifiable by the LED signal (flashing green) on the LMO (see Tab. 6, page 13). The sensor current must be at least  $80 \mu\text{A}$  when the burner is running ( $< 5 \mu\text{A}$  when there is no flame).

If the sensor current is less than  $80 \mu\text{A}$ , clean the flame sensor and check the windows to the combustion chamber.

- Pull flame sensor out of the retainer by the handle with the burner operating.
- Check that the flame is visible at the opening.
- Clean flame sensor with a soft cloth.
- Install flame sensor again.

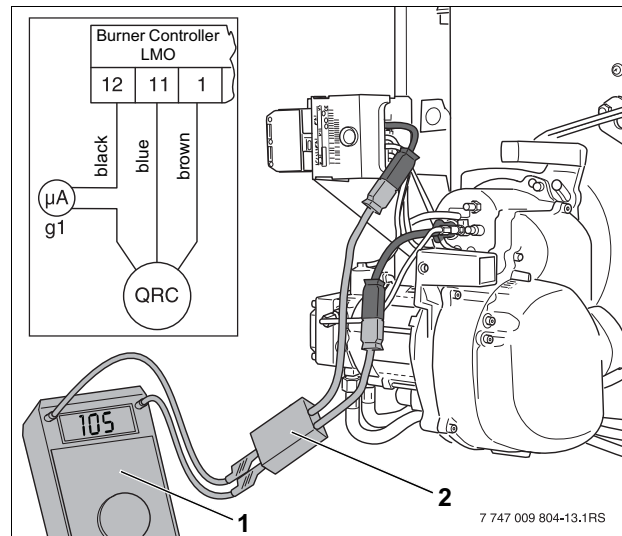


Fig. 31 Circuit diagram and measuring sensor current

**Item 1:** Micro-Amp meter

**Item 2:** QRC adapter

## 8.2 Checking gaskets of boiler and venting system

Leaks in the boiler block or the exhaust system may result in incorrect readings of the CO<sub>2</sub> value. The additional air in the exhaust will show a lower CO<sub>2</sub> content than is actually in the heating gas. If the burner is not operating properly or combustion is unsatisfactory, the CO<sub>2</sub> reading should be double-checked using the following procedure.

### 8.2.1 Determining the upper limit

The burner normally runs with a certain amount of excess air.

As the oil volume approaches the stoichiometric limit of the fuel/air mixture, CO emissions rise abruptly.

That rise can be observed upward of a CO<sub>2</sub> content of 14.8% at the burner.

Proceed as follows:

- Increase the oil pressure until CO levels of 100 ppm - 200 ppm are obtained.
- Read the CO<sub>2</sub> concentration.

If the stoichiometric limit with excess air is below 14.3% (difference > 0.5 %), there must be an air leak between the burner and the testing point.

- Find and close off the leak. Repeat the test to confirm that 14.8% CO<sub>2</sub> can now be reached.

### 8.2.2 Conducting measurement in the combustion chamber

The reading is generally taken in the flue pipe (see Chapter 7.1 "Recording and correcting measured values", page 23).

A direct measurement in the combustion chamber can also be conducted through the inspection port in the boiler door.

If the reading in the combustion chamber differs by more than 0.5% from the reading in the flue pipe, there is an air leak along the route followed by the flue gas.

- Find and seal the leak.

Once the source of excess air entering the flue gas has been eliminated, the burner flue gas levels should be optimized (see Chapter 6 "Initial burner start-up", page 15).

## 9 Laying out oil supply system

Dimension the oil supply system consisting of tank and piping so that a minimum oil temperature of +41 °F at the burner is guaranteed.



### USER NOTE

Do not use heating oil additives with combustion improvers as they do not improve the combustion results with this burner.

Parameters for oil supply system	Data
Internal diameter of oil lines	3/8"
Maximum use	12 feet
Maximum supply pressure	7.3 psi
Maximum return pressure	14.5 psi
Maximum suction pressure drop (vacuum)	5.8 psi (13.4 ft. of head)

Tab. 9 Data on the oil supply system

### 9.1 Installing oil filter

- Installation of an oil filter and the Tigerloop near the burner is required.

We recommend using filter elements of sintered plastic to prevent nozzle blockage.



### SYSTEM DAMAGE

from plugged nozzles.

#### CAUTION!

- Routinely inspect the Tigerloop, vacuum gauge and filter for proper operation. Replace filter annually, or when vacuum gauge indicates increased restriction outside of the green area.

Nozzle size gph	Filter mesh size microns
0.40 – 0.60	10 or less
> 0.6	10 or less

Tab. 10 Recommended filter types



### USER NOTE

Suitable oil filters can be obtained from your Buderus wholesaler.

## 9.2 Sizing the oil supply lines

Follow local code in regards to the installation of oil tanks and oil lines.

The burner is connected to a single-pipe system (see Fig. 32). The pump intake and return lines are connected to the furnished Tigerloop de-aerator and oil filter.



### USER NOTE

Installation of the Tigerloop de-aerator and oil filter is required for the GB125 boiler.

Consider all horizontal and vertical lines, fittings and elbows as part of the total equivalent length of the oil line.

The maximum oil supply line lengths stated in feet (Tab. 11) are dependent on pump suction height. The resistances of the check valve, shut-off valve and four elbows have been taken into account.

The length of the line must be reduced proportionately with additional resistance by fittings and elbows.

The oil line must be laid out with great care.

The oil supply line must be extended to the burner to allow the flexible connection hoses to be attached without undue strain.

Use suitable materials for oil lines. If using copper pipe, use only fittings.

### Possible supply pipe lengths with 3/8" internal diameter.

	Maximum pipe length
Oil tank above burner	330 feet
Oil tank below burner	110 feet (H up to 10 feet)

Tab. 11 Maximum supply pipe length

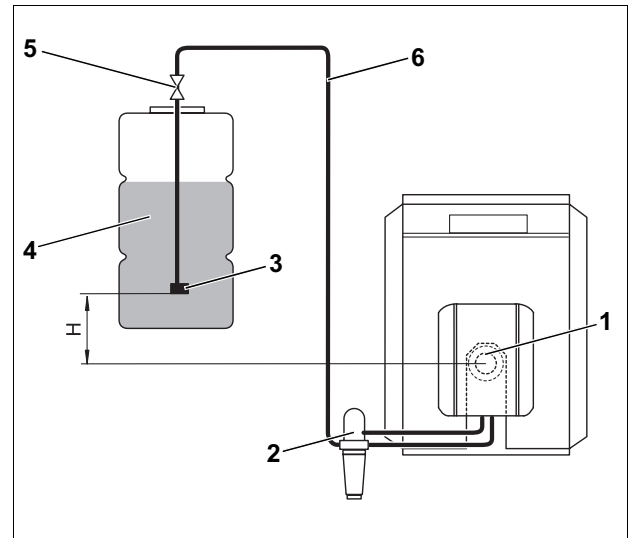


Fig. 32 Single-pipe system  
(in this case with oil tank higher than oil pump)

**Item 1:** Burner

**Item 2:** Oil filter with de-aerator and shut-off valve

**Item 3:** Suction cup

**Item 4:** Heating oil tank

**Item 5:** Tank fitting with fast shutoff valve

**Item 6:** Suction line

### 9.3 Testing the vacuum

A maximum vacuum (negative gauge pressure) of 5.8 psi or 13.4 ft. of head (measured at the oil pump intake connection) must not be exceeded regardless of the oil level in the tank.



#### USER NOTE

The vacuum should be measured using a vacuum tester together with a transparent hose 3 feet in length (available separately) allowing to check the air-tightness of the oil supply system at the same time.

In operation the vacuum gauge on the Tigerloop should display zero (0) pressure.

**If the vacuum gauge shows a reading after the system has reached operating state (air bled from lines, oil filter filled, system at temperature), check the following possible causes:**

- Oil connection line kinked, or defective or plugged.
- Oil filter very dirty.
- Shut-off valve not opened sufficiently or dirty.
- One or more parts of the system (e.g. joints, compression fittings, oil lines, oil filter connection, oil tank) restricted due to incorrect assembly (overtightening).
- Shutoff valve on tank fitting dirty or faulty.
- Suction line in tank dirty or restricted from debris.

## 9.4 Checking oil supply line for leaks

The oil supply line can be checked for leaks using a vacuum tester and a 3 foot transparent hose (available separately).

- Fit the transparent hose (Fig. 33, **Item 1**) in the oil supply line downstream of the oil filter (Fig. 33, **Item 2**).
- Form a loop as shown (Fig. 33).
- Start burner and run for at least three minutes.
- Switch off burner.
- Visually check the amount of air that collects (Fig. 33, **detail A** and **B**).

If only a small amount of air collects at the highest point of the loop (Fig. 33, **detail A**), the oil line is sufficiently air-tight.

If larger air bubbles form (Fig. 33, **detail B**), the oil supply line and/or the connections are leaking.

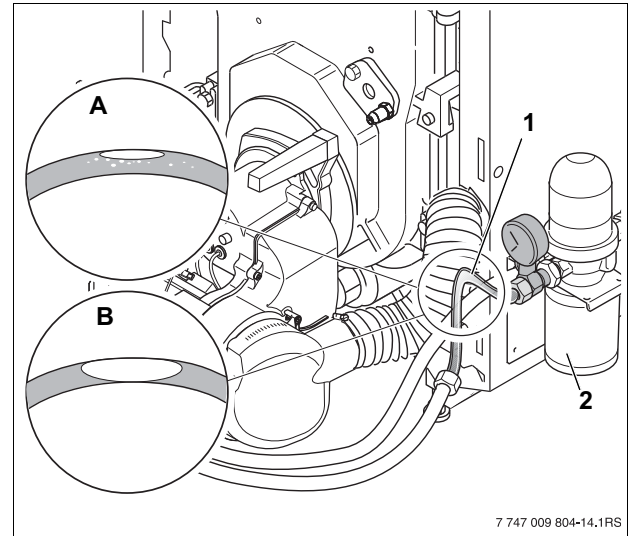


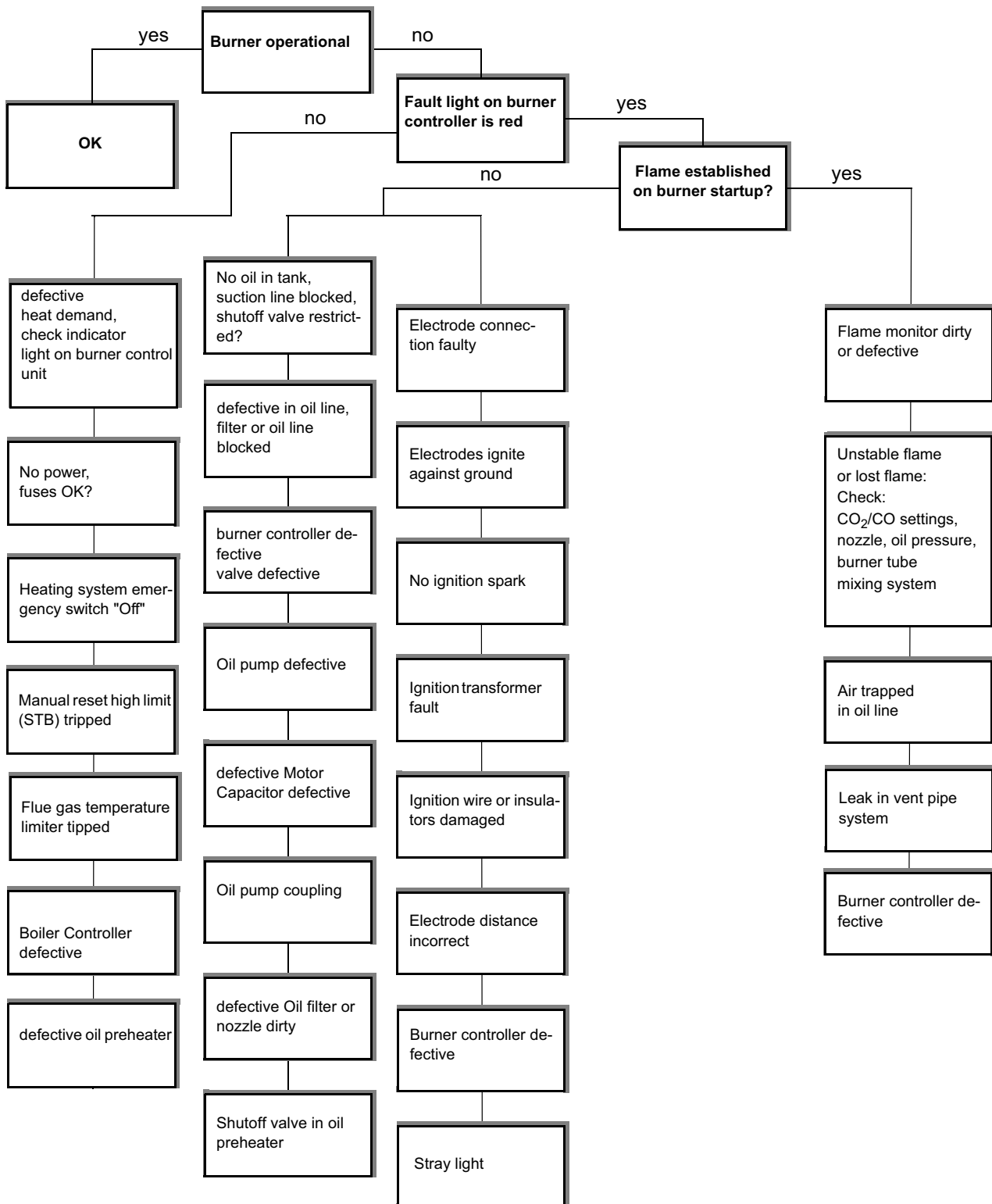
Fig. 33 Checking oil supply line for leaks

**Item 1:** Transparent hose

**Item 2:** Tiger loop oil filter

## 10 Troubleshooting burner faults

### 10.1 Troubleshooting flow chart





## 10.2 Faults – correcting the causes

Fault	Cause	Remedy
CO <sub>2</sub> level too high	Fan pressure too low.	Increase fan pressure (see Chapter 4 "Technical data and scope of delivery", page 9).
	Oil flow too high.	Reduce oil pressure (see Chapter 4 "Technical data and scope of delivery", page 9) Check mixing system.
	Combustion chamber insufficiently ventilated.	Insufficient air, provide ventilation.
	Burner dirty.	Clean burner and fan.
	Incorrect nozzle installed.	Replace nozzle.
	Nozzle fault.	Replace nozzle.
	Incorrect mixing system.	Replace mixing system.
CO <sub>2</sub> level too low	Fan pressure too high.	Reduce fan pressure (see Chapter 4 "Technical data and scope of delivery", page 9).
	Oil flow too low.	Increase oil pressure (see Chapter 4 "Technical data and scope of delivery", page 9).
	Extraneous air.	Tighten retaining screws on burner door with a tool. Check flue pipe for leaks (see Chapter 8.2 "Checking gaskets of boiler and venting system", page 35).
	Seal between burner tube and mixing system faulty.	Install new gasket.
	Incorrect mixing system.	Check mixing system.
	Incorrect nozzle installed.	Replace nozzle.
	Nozzle fault.	Replace nozzle.
	Nozzle filter dirty.	Replace nozzle.
Burner does not ignite.	Power failure.	Check main switch and fuses. Check operating switch, thermostat and manual reset high limit.
	Safety chain connected?	Check safety devices.
	Oil preheater release thermostat faulty.	Replace oil preheater.
	<b>Caution:</b> if the burner has not been used for some time, the heating-up time is approx. two to three minutes.	If the heating-up time is exceeded: check burner control unit and replace if necessary (test with burner tester). Check burner motor and capacitor and replace if necessary.
Burner starts, oil gauge on oil filter remains empty.	Incorrectly connected at initial start-up.	Check that oil hoses are correctly connected.
	Oil line was not filled before initial start-up and it takes several minutes until oil is supplied.	Bleed oil line (see Chapter 6.3 "Checking and connecting the oil lines", page 15).
	Heating oil in tank? Valve in suction line open?	Check oil tank gauge and valve in suction line.
	Incorrect flow direction of check valve.	Check direction of flow of check valve.
	Faulty coupling between motor and oil pump.	Replace coupling.
	Leak in suction line or excessive vacuum. Oil line kinked.	Check oil line (see Chapter 9.4 "Checking oil supply line for leaks", page 39).
	Separate valve, e.g. outside tank valve, closed.	Open valve. Check layout of oil line.

Tab. 12 Fault table

Fault	Cause	Remedy
Burner starts, oil pressure is present, ignition spark absent, fault shut-off.	Ignition transformer or ignition wiring not OK.	Replace ignition transformer or wiring. Check ignition transformer power supply.
	Very worn ignition electrodes or damage in insulators.	Replace ignition electrodes.
	Incorrect ignition electrode settings.	Correct ignition electrode settings as specified.
	Extraneous light message.	Check flame sensor and replace if necessary. Check solenoid valve and oil pump and replace if necessary.
	Automatic igniter fault.	Replace automatic igniter.
Burner ignites properly but flame monitor does not respond.	Flame monitor dirty or faulty.	Check flame sensor, clean or replace as necessary. Measure sensor current.
	Automatic igniter fault.	Replace automatic igniter.
Burner operating, ignition spark present, flame is not ignited or burner shuts off while operating.	Oil solenoid valve does not open.	Replace oil solenoid valve coil. Check electrical connection.
	Oil pipe, oil preheater and nozzle connection fault.	Check flow through oil pipe, oil preheater and nozzle, replace if necessary.
	Oil pump does not pump oil, oil tank empty.	Check oil pump and oil tank gauge and replace if necessary. Fill oil tank.
	Nozzle filter dirty.	Replace nozzle.
	Leak in suction line.	Check suction lines, tighten retaining screws.
	Suction line not bled.	Bleed suction lines at pressure gauge connection on oil pump.
	Oil filter dirty.	Clean oil filter, replace if necessary.
	Oil temperature below approx. +41 °F.	<b>Caution:</b> if the oil temperature is below approx. +41 °F, wax can start to separate out and clog the filter. Check oil pump filter, clean or replace as necessary.
	Leak in flue gas system.	Check for flue gas in combustion air.
	Mixing system dirty.	Check mixing system, clean if necessary.
	Burner setting incorrect.	Check burner setting, correct if necessary.
Fault light on automatic igniter is red.	Indicates a fault in the automatic igniter.	Read flashing code (see Chapter 5.3 "Repairing faults in the burner controller", page 14).
Explosion or burner starts violently.	Incorrect ignition electrode layout.	Check ignition electrodes, replace if necessary. <b>Caution:</b> repeated attempts to start the burner can produce oil vapor formation that can cause explosions.
	Oil pressure too low.	Correct oil pressure.
	Nozzle fault.	Replace nozzle.
	Leak between oil pump, oil pipe, oil preheater and nozzle.	Check for leaks.
	Jet not shutting off properly, thus oil vapor is uncontrolled.	Solenoid valve does not close. Replace solenoid valve and oil pump if necessary. Shutoff valve in preheater faulty. Replace valve.
	Air in nozzle cylinder.	Check all seals in oil supply system.
	Solenoid valve not opening properly.	Check coil, replace if necessary.

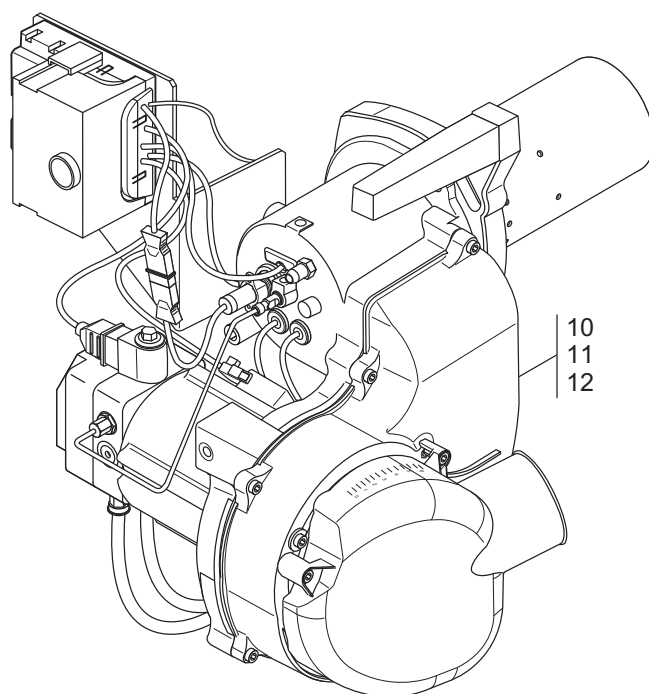
Tab. 12 Fault table

Fault	Cause	Remedy
Dirty nozzle, deposits on mixing system.	Nozzle fault.	Replace nozzle.
	Oil pressure too high.	Correct oil pressure.
	Incorrect nozzle.	Check jet (see Chapter 4.3 "Settings and nozzle installation", page 10), replace jet if necessary.
	Incorrect mixing system.	Check mixing system, replace if necessary (see Chapter 4.1 "Burner types", page 9).
	Dirty mixing system.	Clean mixing system, replace if necessary.
	Incorrect ignition electrode.	Check ignition electrodes, replace if necessary (see Chapter 4.1 "Burner types", page 9).
	Leak between nozzle and oil preheater.	Clean nozzle and oil preheater carefully, replace if necessary (check sealing surface).
	Variable oil pressure-air inclusion.	Bleed oil line.
	Incorrect combustion chamber pressure.	Check damping, adjust damper if necessary.
	Seal between mixing system and burner tube faulty.	Check gasket, replace if necessary.
	Pressure control valve fault.	Replace oil pump.
Jet fails to shut off or oil continues to burn after burner cuts out.	Inadequate bleeding of oil lines.	Bleed oil line (see Chapter 6.4 "Bleeding oil line", page 16).
	Leak in oil suction line causing aspiration of air. Air in nozzle cylinder.	Check all seals in oil supply system.

Tab. 12 Fault table

## 11 Spare parts

The following parts are available from Bosch Thermo-technology Corp. If there are several Buderus article numbers for one item number, the numbers for the various models are listed in the relevant columns. Otherwise the table shows the number of components for each model.



7747102303.aa.RS-Brennervarianten BE1.3-2.3 GB120V US

Fig. 34 Burner models BE 1.3/2.3 GB

Catalog 7747102303  
Description Burner models BE 1.3-2.3 GB 120V  
(Fig. 34)

Item	Description	Part number
10	Oil burner BE 1.3-22 GB	7747021905
11	Oil burner BE 2.3-30 GB	7747021906
12	Oil burner BE 2.3-35 GB	7747021907

Tab. 13 Burner models BE 1.3-2.3 GB

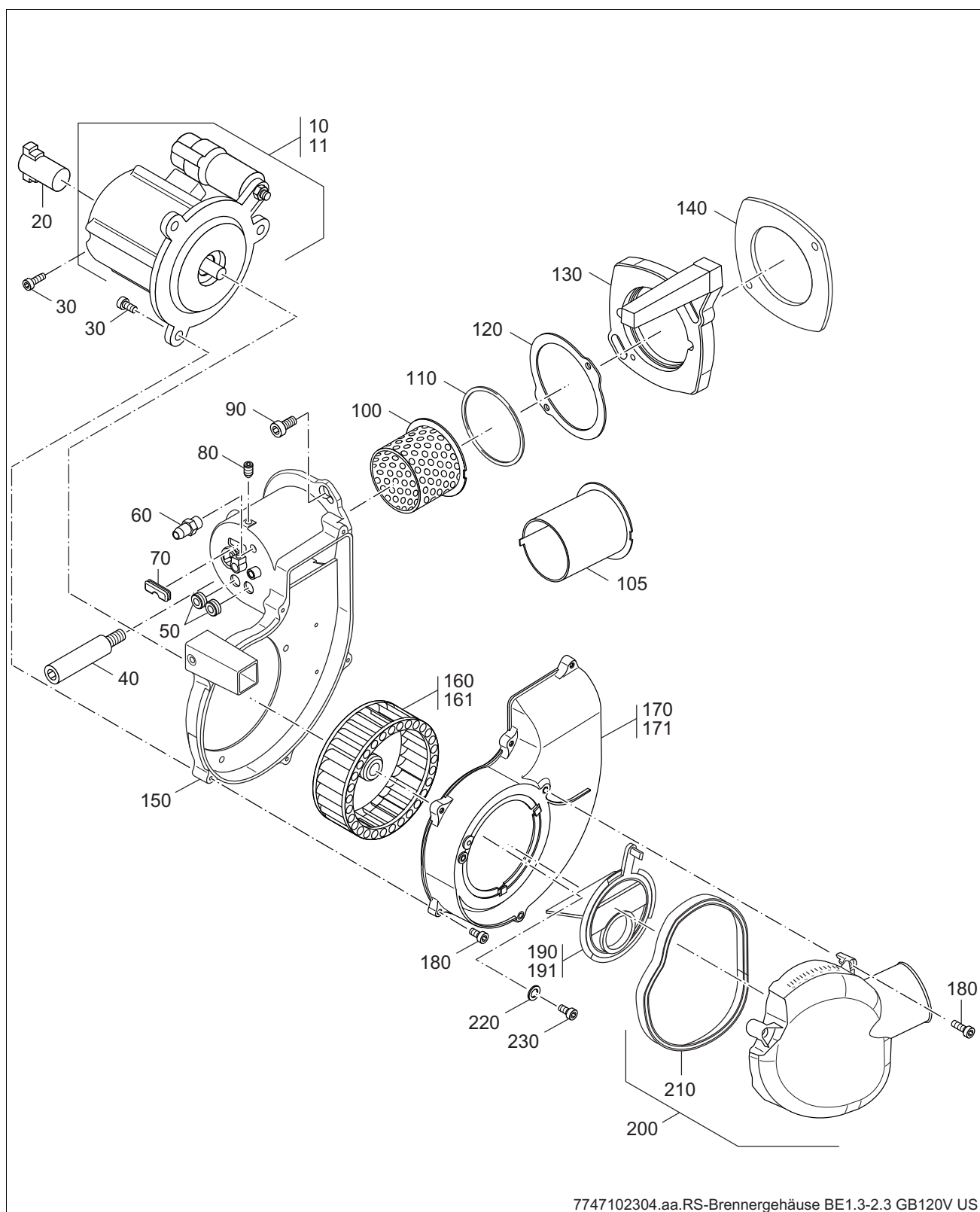


Fig. 35 Burner housing BE 1.3-2.3 GB US

Catalog 7747102304  
 Description Burner housing BE 1.3-2.3 GB 120V US  
 (Fig. 35)

Item	Description	Part number
10	Motor HG 150W 120V/60Hz	7747010778
20	Motor coupling, double-flatted	05883147
30	Allen-head screw DIN912 M5x12-8.8	7747015963
40	Bolt 105mm 8x25	7747015963
50	Cable grommet, dia. 14.4 mm	63029232
60	Pressure testing nipple, R1/8"	05481193
70	Cable grommet, dia. 29x11 mm	05883918
80	Set screw DIN916 8x12	7747015963
90	Allen-head screw DIN7984 M8x25-8.8	7747015963
100	Distributor cylinder HG-A V1 for BE 2.3 /35 kW	63006876
105	Distributor cylinder HG-A annular groove 4.9 for BE 1.3-2.3 /22/30 kW	63032532
110	O-ring 92x3	63002998
120	Gasket dia. 128x2	63025160
130	Burner flange HG-A	63038318
140	Gasket 143x143x6 set V3	7747000719
150	Housing base	-
160	Fan impeller dia. 133x38.4mm for BE 1.3 -22 kW US	63003779
161	Fan impeller dia. 133x59.8mm for BE 2.3 -30/35 kW	63003780
170	Housing cover HG-A size 1 for BE 1.3 -22 kW	63006885
171	Housing cover HG-A size 2 for BE 2.3 -30/35 kW	63006886
180	Allen-head screw DIN912 M5x20-8.8	7747015963
190	Air intake baffle HG A size 1 for BE 1.3 -22 kW	63006869
191	Air intake baffle HG A size 2 for BE 2.3 -30/35 kW	63006873
200	Air intake silencer assy. HG-A RLU	63028801
210	Gasket for air intake silencer	-
220	Washer DIN9021-5.3-A3K	7747015963
230	Machine screw DIN912 M5x8	7747015963

Tab. 14 Burner housing BE 1.3/2.3 GB

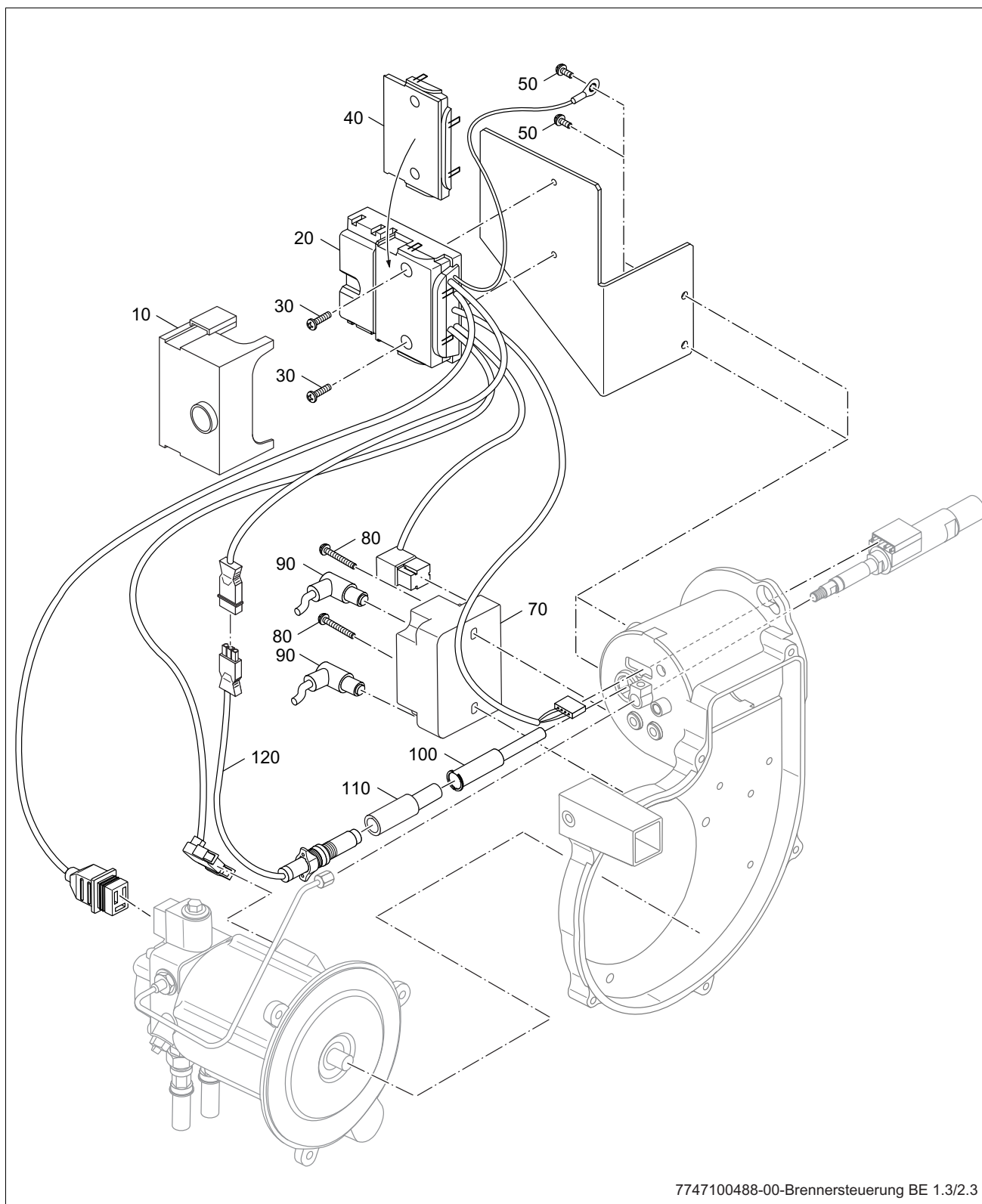


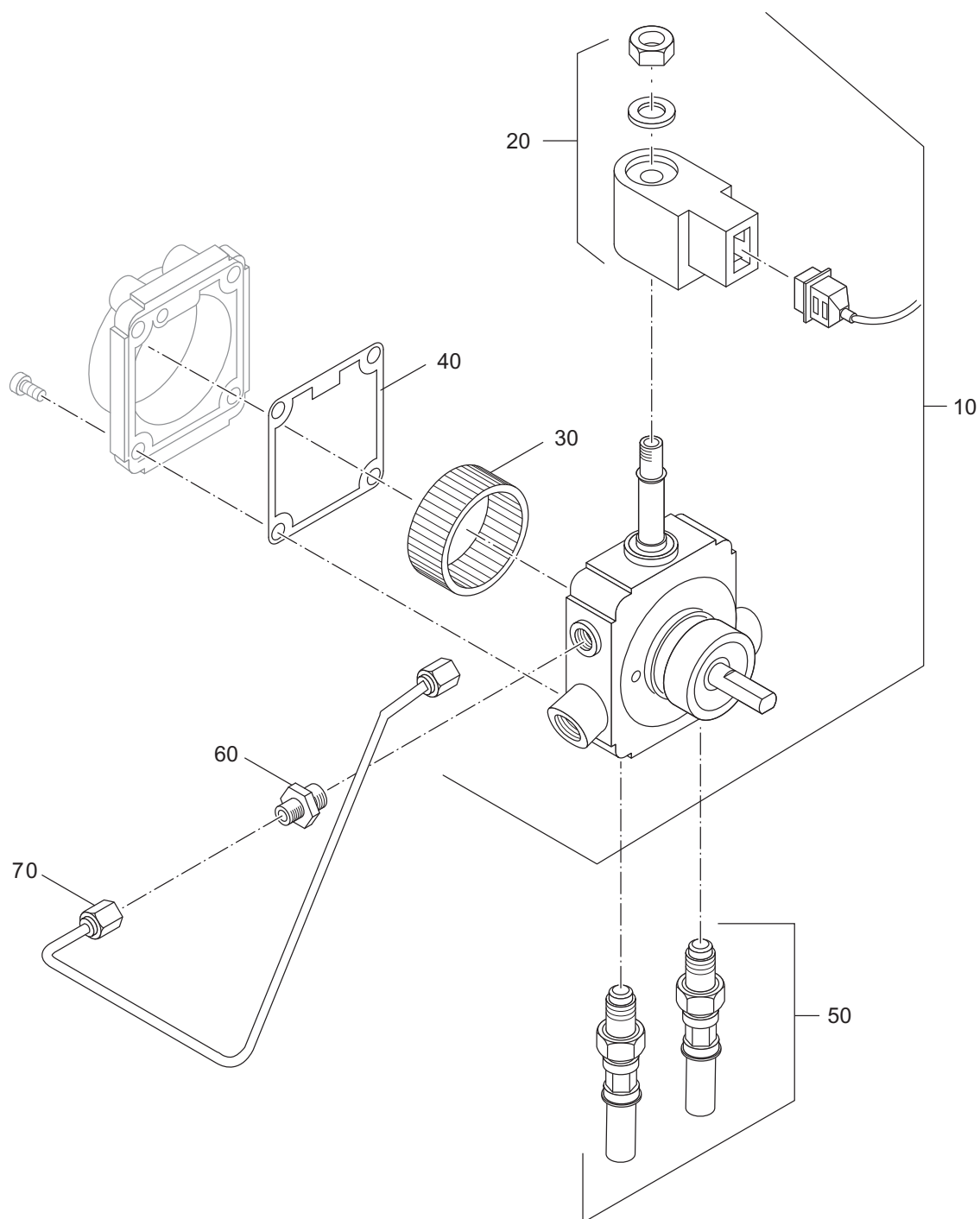
Fig. 36 Burner control system BE 1.3/2.3 GB



Catalog 7747100488  
 Description Burner control system BE 1.3-2.3 GB US  
 (Fig. 36)

Item	Description	Part number
10	Burner control unit LMO 120/60Hz	7747010788
20	Base assy. HGA single-stage V5 for QRC base is supplied ready-wired only	63045082
Available spare parts:		
30	Screw M4x16	7747015963
40	Base cover assy. HG-A single-stage	63029996
50	Screw M4x8	7747015963
60	Mounting bracket	-
70	Igniter module Beru EZG 120V/60Hz	7747010786
80	Screw M4x50	7747015963
90	Ignition lead BE/BE-A	63006890
100	Socket tube HG V4	63045054
110	Socket tube extension BE_3 RLU	63032472
120	UV flame sensor QRC 120V/60Hz	7747010789

Tab. 15 Burner housing BE 1.3/2.3 GB



7747100489-00-Ölpumpe Suntec OLE55C BE 1.3/2.3

Fig. 37 Oil pump BE1.3/2.3

Catalog 7747100489  
 Description Oil pump BE 1.3-2.3 US GB (Fig. 37)

Item	Description	Part number
10	Oil pump Suntec OLE35C Rev 6 NA (for BE1.3-21 and BE 2.3 GB-28)	7747010779
10	Oil pump Suntec OLE55C Rev 6 NA (for BE 2.3 GB-34)	7747010781
Available spare parts		
20	Solenoid coil Suntec120V/60Hz	7747010782
30	Filter A70 Rev. 3 for SUNTEC AS47 oil pump	05883218
40	Cover gasket	63016667
50	Complete hose set BE/SE	63031508
60	Straight connector XGE 4LLR 1/8"	05883224
70	Oil pipe assy. HG-A	63003054

Tab. 16 Jet assembly BE 1.3/2.3 GB

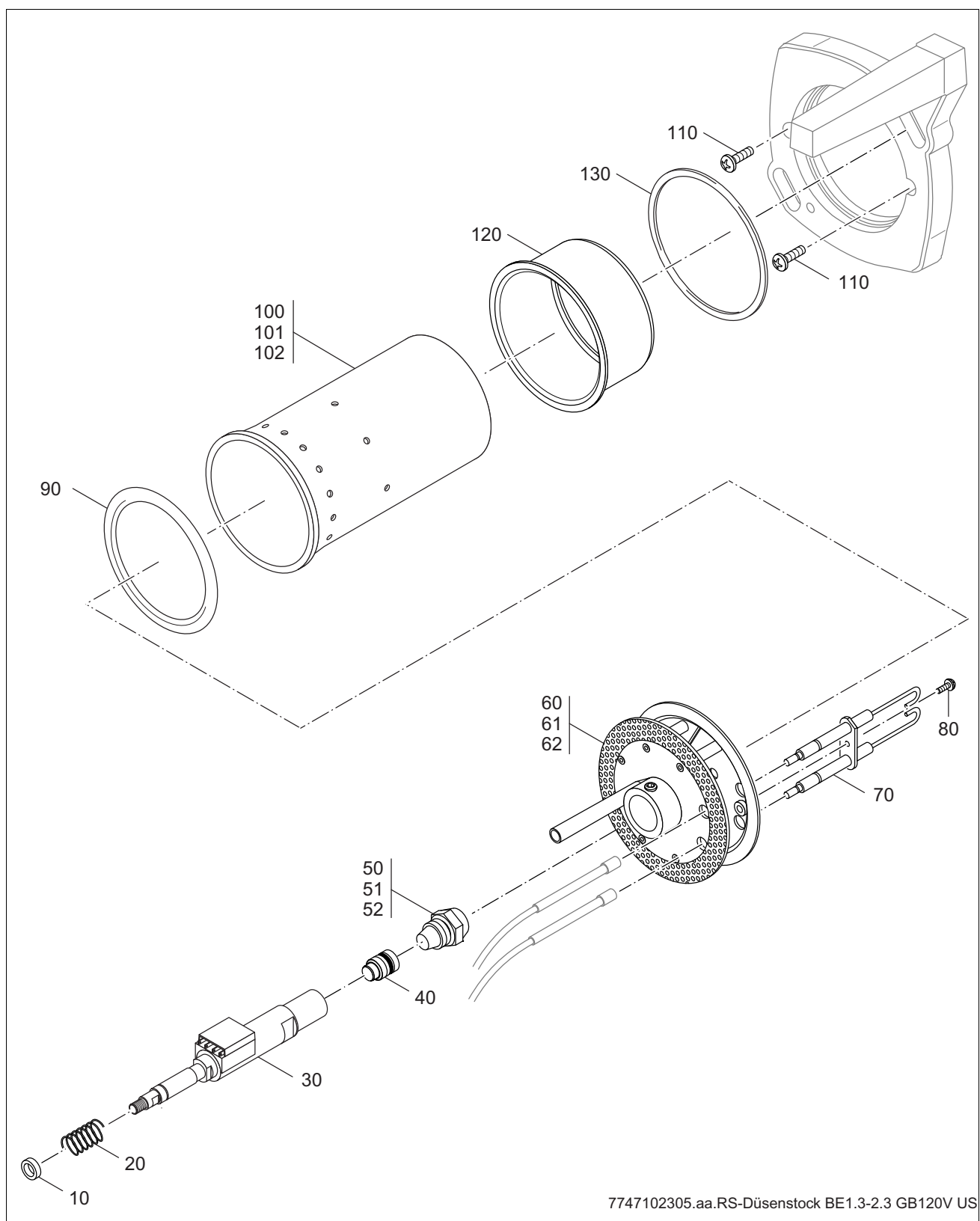


Fig. 38 Jet assembly BE 1.3/2.3

Catalog 7747102305  
 Description Jet assembly BE 1.3-2.3 GB 120V US  
 (Fig. 38)

Item	Description	Part number
10	Washer D9.5/14x4mm	63029232
20	Spring DIN2098-1.8x12.5x36mm	7747012279
30	Oil preheater FPHB5-LE PTC120	7747010787
40	Diaphragm valve LE6	63025126
50	Danfoss oil jet 0.45 gph 80 GR HFD -22 kW	7747009738
51	Danfoss oil jet 0.55 gph 60 GR HFD -30 kW	7747009739
52	Danfoss oil jet 0.65 gph 80 GR H -35 kW	7747014290
60	Mixing system BE 12.1/27.5/5.8/25 -22kW	7747002845
61	Mixing system BE 12.1/27.5/6.9/25 VA -30kW	7747002846
62	Mixing system BE 12.4/27.5/8.3/25 VA -35kW	7747002847
70	Ignition electrode BE/BE-A Type 4 L34	63018295
80	Machine screw DIN912 M4x10	7747015963
90	Gasket D81 x 2	63037931
100	Burner tube D83/L214/3.0/2.5 SiC for BE 1.3 GB 22 kW	63022607
101	Burner tube D83/L224/5.9/4.8 SiC for BE 2.3 GB 30 kW	63030727
102	Burner tube D83/L224/7.0/5.7 SiC for BE 2.3 GB 35 kW	63030728
110	Dome-head screw DIN7985 M5x10-5.8 galv.	05883174
120	Socket tube L50	63022595
130	O-ring 92x3	63002998

Tab. 17 Jet assembly BE 1.3/2.3 GB

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