

Installation and operating instructions for the KB-series



KB 20 / 7 kW

KB 40 / 13 kW

KB 45 / 24 kW

KB 50 / 28 kW

KB 75 / 38 kW

Innovative Heating systems

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Deutschland
Land der Ideen

Ausgewählter Ort 2011

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1. Warning and safety information

1. Meaning of the warning and caution signs

ATTENTION Possible material damage if ignored

CAUTION possible light and medium injury if ignored

WARNING severe or life-threatening injury or possible death if ignored

DANGER probable life-threatening injury or death if ignored

2. Read and store the installation and operating instructions

Read these installation and operating instructions carefully and follow the instructions. These instructions guide contains the complete information about safety, installation, and setup and maintenance of the KB series.

Failure to follow these instructions can result in personal injury, fire or property damage. These instruction guide is part of the KB series. Store this manual near the KB-Series, so that in the future you may quickly consult it.

3. Qualified personnel

The installation, commissioning and maintenance may only be performed by qualified persons.

Otherwise, damage may occur to persons or product. As part of training for you free in home SCHEER you obtain the necessary qualifications for working on the BE-KB-burner and the Handling of heating systems on ships.

4. Electrical work

All electrical work must be performed by qualified personnel. Switch the system power supply OFF before working on the KB series. Check the wiring when replacing components.

5. Prescribed use of the KB series

The KB-series will be used to produce hot water for space heating and optionally for heating fresh water. The model selection is based on a heat load calculation. The KB-series is not designed to heat the boiler room. Boiler and burner of the respective KB-series are perfectly matched for optimal performance and may not be modified. Example: Burner BE-KB 40 is matched -and should only be installed- to boiler KB 40.

6. Diesel fuel or fuel oil EL

The KB-series may only be operated with diesel or fuel oil EL (standard and low sulfur) according to DIN EN 590. It is designed solely for operation with these fuels. With other fuels there may be injuries of persons or property due to explosions or malfunctions of the burner.

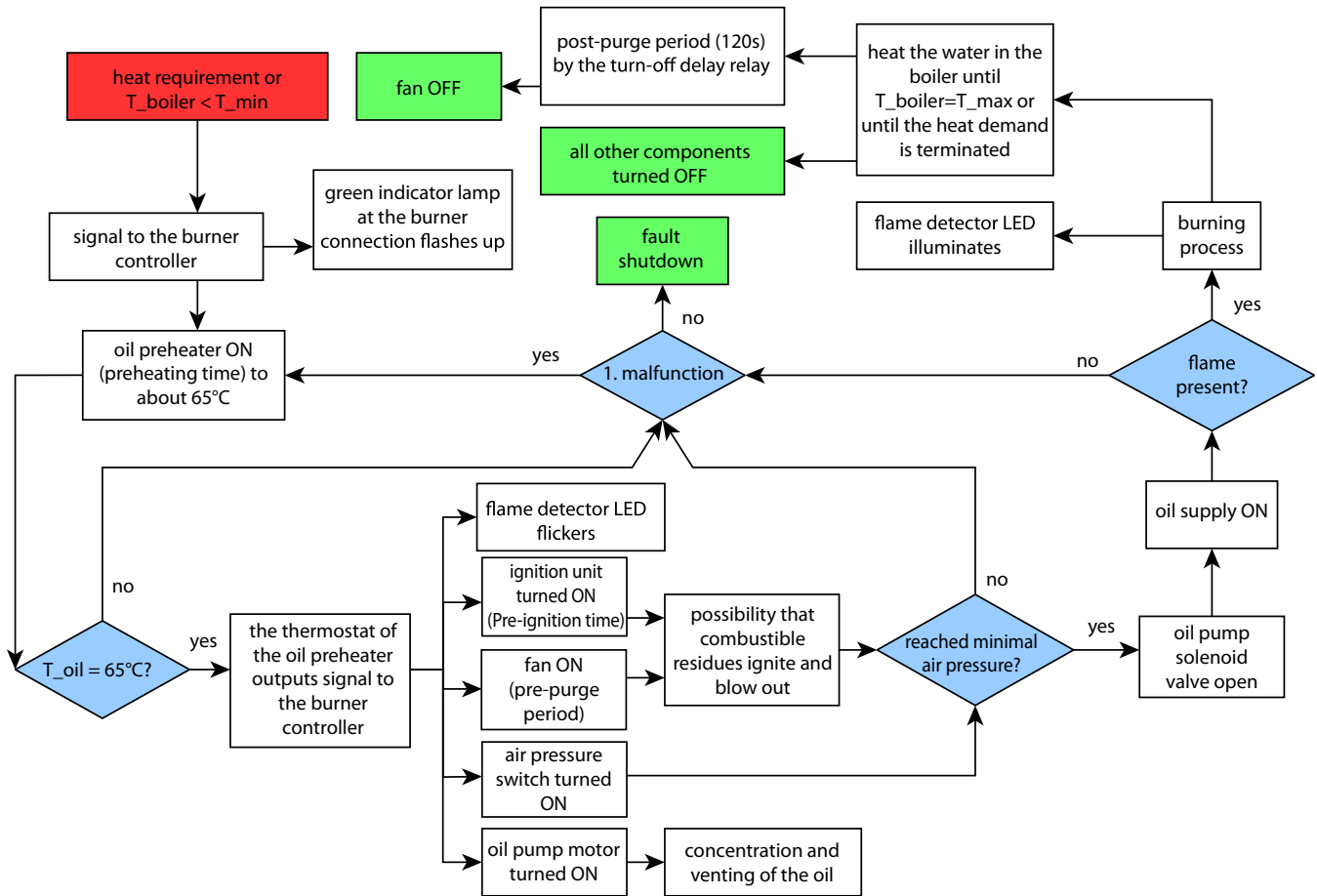
7. Use genuine spare parts

Replace components of the KB series only with genuine spare parts from SCHEER. The components are specially adapted to the requirements of the KB series. Should you use parts from other manufacturers, the proper function can not be assured and the guarantee expires. When placing an order please indicate the type designation and serial number. Both can be found on the type plate of the boiler and the burner. This will allow us to supply you with the suitable replacement parts.

8. Annual Maintenance

Have the KB series annually cleaned and maintained by qualified staff in order to enable trouble-free and energy efficient operation of the KB series. The maintenance procedure is described in Chapter 5.

2. Operating principle the KB series



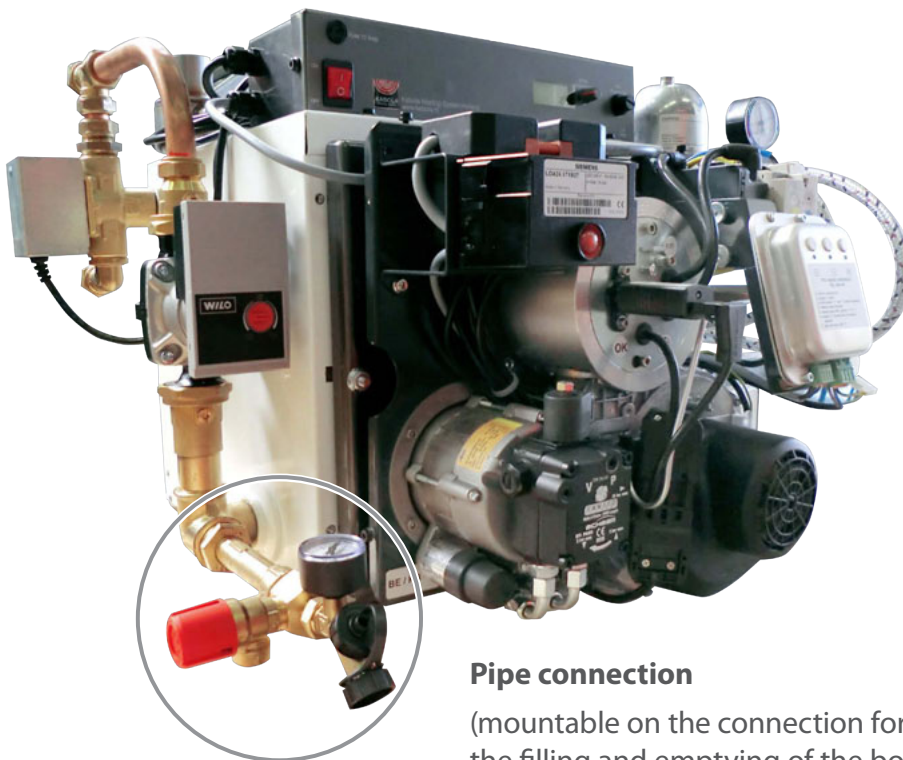
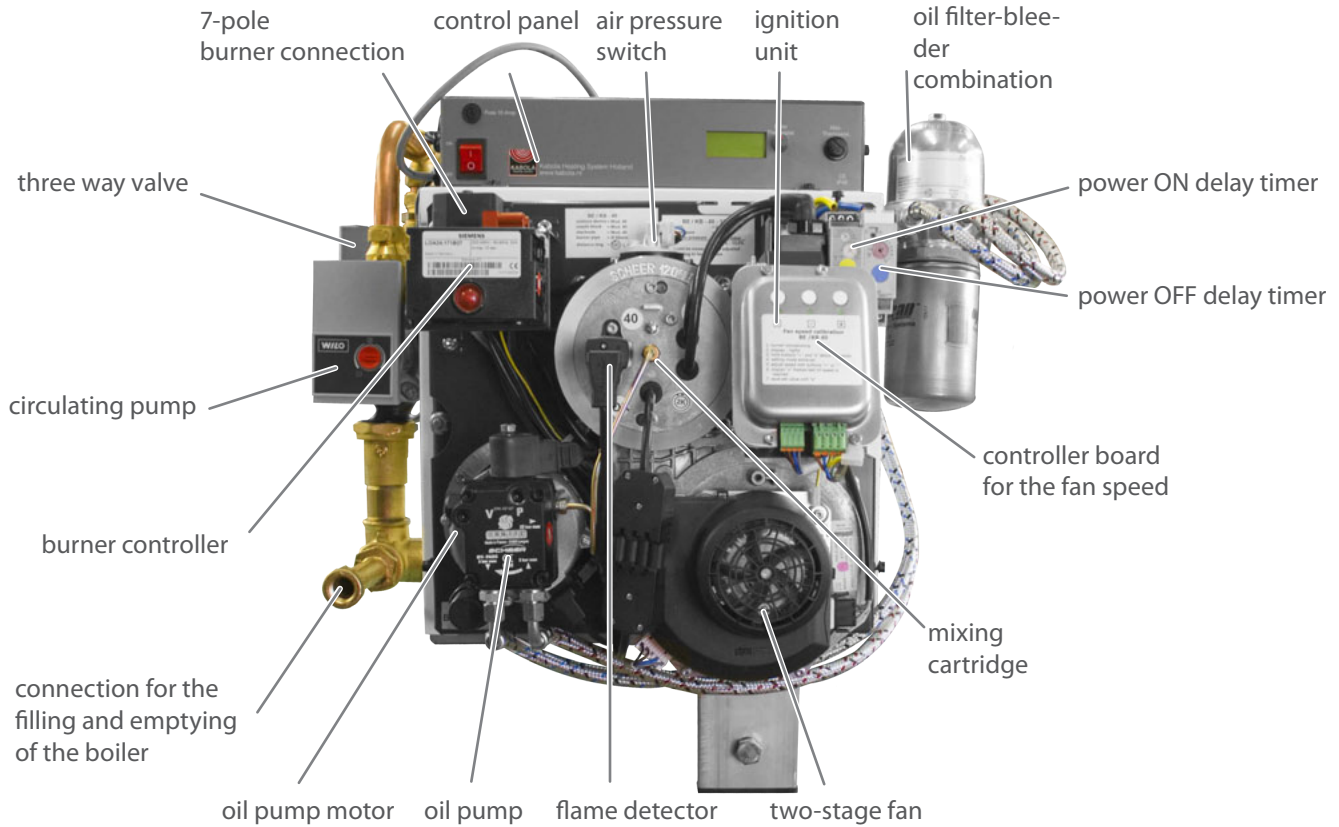
At initial startup, or in case of voltage drop or voltage interruption, the power-on delay delays the burner start-up by 120 s. In case of interruption during the operation the power-on delay and the post-purge period of the fan occur in parallel.

2.1 Overview of the KB Series

		KB 20	KB 40	KB 45	KB 50	KB 75
Operating performance	kW	7	13	24	28	38
Dimensions (H / W / D)	cm	40 / 38 / 52	42 / 38 / 62	44 / 38 / 64	52 / 43 / 70	52 / 43 / 70
Weight (standard / combi)	kg	65 / -	75 / 80	80 / 85	90 / 95	115 / 120
Efficiency	%	92	93	93	94	94
Water heating plate heat exchanger		-	Option (combi)			
Water capacity of the boiler	Liters	8.5	17.5	20.0	23.0	37.0
Fuel		Diesel / Heating oil according to DIN EN 590				
Oil flow	L/h	0.69	1.27	2.35	2.75	3.73
Oil nozzles		0.18 - 80° SC	0.25 - 80° SC	0.40 - 60° SC	0.50 - 60° SC	0.65 - 60° SC
Exhaust temperature	°C	170 - 220	150 - 200	145 - 205	145 - 200	140 - 190
	°F	338 - 428	302 - 392	293 - 401	293 - 392	284 - 374
Exhaust pipe connections - Ø	mm	Ø 80				
Exhaust pipe - Ø	mm	Ø 50			Ø 80	

2.2 Construction of the KB Series

shown is a KB 20/7 kW with storage tank connection



3. Components of the KB-Series

This chapter presents the components of KB-series and their functionality. An exploded drawing and spare parts list can be found on pages 35 and 36 .

3.1 Oil filter-bleeder combination

The oil filter-bleeder combination cleans the oil and keeps it air-free. The trouble-free operation of the burner is only achieved with clean, air-free oil.

Use only **oil filter and bleeder made of metal!** Plastic parts are not permitted for fire safety reasons.

The KB-Series are delivered with the oil filter-bleeder combination made of metal, as shown in the figure. The oil filter contains an ultra-fine filter insert. The oil bleeder vents the oil automatically.

If you use any other oil filter or bleeder, please note the following minimum requirements:

1. Oil filter

- completely made of metal
- suitable for single pipe systems
- an ultra-fine filter insert

2. Oil bleeder

- completely made of metal
- automatic bleeder

The installation of the oil filter-bleeder combination is presented in Section 4.5

The **underpressure manometer** shows the underpressure in the supply flow to the oil pump.

The system is running optimally in the underpressure range from 0.0 to -0.3 bar. A filter change **is recommended for values between -0.3 and -0.5 bar**, while even greater underpressure may cause malfunctions and an increased pump wear should be expected.

Oil filter-bleeder combination made of metal

Art. No. 040513



Underpressure manometer

Art. No. 040126



3.2 Oil pump motor 70 W with operation capacitor

ATTENTION Only use genuine spare parts!

Replace the oil pump motor only with a genuine spare part. This oil pump motor has a stator with a double enamelled wire, especially suitable for the marine sector.

Voltages below 200 V may lead to stoppage of the oil pump motor!

oil pump motor	
Supply voltage	220 to 250 V AC (50/60 Hz)
Current consumption	0.54 A
Power	70 W
Speed	2810 min ⁻¹ at 50 Hz 3200 min ⁻¹ at 60 Hz
Operation capacitor	temperature resistant up to 100 °C (212 °F) 3 µF, 420 V AC



Oil pump motor
Art. No. 015138

Check the capacitor at every maintenance. If the capacitance deviates by more than 5 % (smaller 2.85 µF) then the capacitor has to be replaced. The maintenance procedure for the capacitor is described in section 6.4.

3.3 Oil pump

ATTENTION Only use genuine spare parts!

Under no circumstances should you replace the oil pump by another oil pump type. The oil pump is specially configured for use in the BE-KB-burner. Use only the genuine oil pump from SCHEER.



Oil pump
Art. No. 011236

You can find the model-dependent oil pressure directly on the label on the burner.

Oil pump	
Pressure range	4 to 25 bar
Viscosity range	2 to 12 mm ² /s
Forward / return flow pressure	respectively max. 2 bar
Speed	max. 3600 min ⁻¹
Operating temperature	0 to 60 °C (32 to 140 °F)

3.4 SCHEER oil nozzles

ATTENTION Only use genuine spare parts!

Use only genuine SCHEER oil nozzles! A trouble-free operation can only be ensured through the use of genuine SCHEER nozzles. They are specially configured and tested in a flow range with only 5% tolerance.

The nozzle replacement is described in section 6.2



SCHEER oil nozzles

	SCHEER oil nozzles	Art. No.
KB 20	0.18 - 80° SC	022276
KB 40	0.25 - 80° SC	022277
KB 45	0.40 - 60° SC	022368
KB 50	0.50 - 60° SC	022370
KB 75	0.65 - 60° SC	022373

3.5 Centrifugal fan & Controller board

The centrifugal SCHEER 2-stage fan is a powerful fan that is used in all models of the KB series. The fan through its centrifugal operation is essentially prohibiting dust and dirt particles to enter the airway.

The fan is in constant communication with the controller board. Through simple use of the controller board, the speed of the fan and thus an optimum combustion quality can be adjusted.

The operation is described in Chapter 5.

Centrifugal fan	
Supply voltage	230 V AC (50 Hz)
Power input	135 W (depending on the air flow)
Speed	max. 8500 min ⁻¹ (depending on the air flow)
Air flow	max. 190 m ³ /h
Back pressure	max. 3200 Pa and respectively 32 mbar



Centrifugal fan
Art. No. 015112



Controller board	Art. No.
KB 20	015374
KB 40	015376
KB 45	015377
KB 50	015378
KB 75	015379

3.6 Power-on & power-off delay timers

power-on delay timer 120 seconds

Art. No. 070555 (yellow)



The **power-on delay** (marked by a **yellow dot**) delays the burner start-up for 120 seconds after a power interruption (switching over from on-board power to mains power).

power-off delay timer 120 seconds

Art. No. 070553 (blue)



The **power-off delay** (marked by a **blue dot**) enables at the end of the heat demand a post-purge period of the fan for 120 seconds.

3.7 Air pressure switch

The air pressure switch controls the burner fan pressure and is connected to the solenoid valve of the oil pump.

The solenoid valve opens only when there is sufficient air pressure, so that the combustion process can start.

When the air pressure is insufficient, the air pressure switch prevents the leakage of oil into the combustion chamber.

Thus avoiding the contamination of the combustion chamber from oil and the possibility of explosions at the next start-up of the burner.



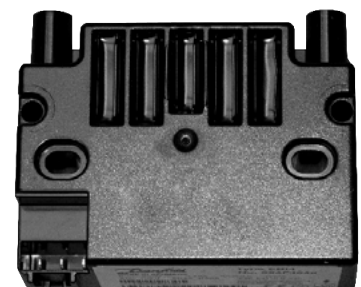
air pressure switch

Art. No. 015180

3.8 Ignition unit

The SCHEER ignition unit is an electronic ignition unit for intermittent ignition between 2 electrodes. Low weight and small dimensions, due to the high operating frequency, makes the SCHEER ignition unit very suitable for modern compact burners.

Connections with a plug on the primary side and secondary side make installation and service quick and simple.



ignition Unit

Art. No. 010276

3.9 Flame detector

The flame detector evaluates the flames based on their flicker frequency. The SCHEER flame detector is more efficient than a simple light flame detector.

Through the integrated frequency-interference suppression neither Light-resembling radiation (e.g. glowing surroundings) nor constant frequencies (e.g. fluorescent lamps) are recognized as a flame.

Unwanted influences of flame detection are thus avoided.

Operating status display:

LED off	Flame detector inactive
LED flashes	Safety testing is conducted, flame detector is active, no flame detected.
LED is lit	Safety testing is conducted, flame detector active, flame detected.

No adjustments are required for the SCHEER flame detector at initial commissioning or maintenance!



flame detector
Art. No. 020064

3.10 Burner controller

The burner controller takes over the operation/start-up and supervision of the burner. If a fault occurs during the start or burning process, the burner controller goes to a fault shutdown.

Fault	Response
Power failure	Restart
Loss of flame during operation	Restart
External light on burner startup	Fault shutdown
No flame after the safety period	Fault shutdown



burner controller
Art. No. 020100

Control program by fault shutdown

1. Triggers the fault shutdown in the burner controller
2. Immediate shutdown (<1 s) of all relevant for the oil supply components (solenoid valve, oil pump motor, oil preheater, igniter)
3. Interruption of the oil supply, and termination of the burning process
4. Fault indicator in shutdown reset button lights-up red

Under Troubleshooting on page 30 possible causes of fault shutdown and solutions are listed.

Low voltage detection

A separate circuit in the burner controller ensures that at voltages below 165 V AC the burner start-up is prevented or -without the release of oil- a fault shutdown is triggered.

3.11 Circulating pump

The three-stage circulating pump is responsible for the circulation of the boiler water and is mounted in the return flow of the boiler water.

The venting of the water system of the circulating pump is described in Section 4.4.

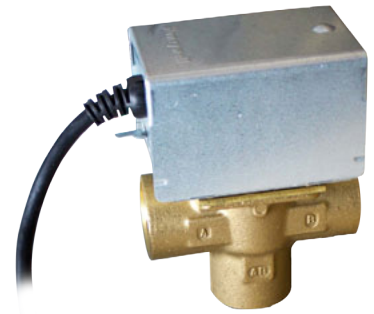


circulating pump
Art. No. 9-I053

3.12 Three way valve for the version with storage tank loading

The three way valve is provided with an electric drive. It is used for the two-point control as a mixer or distribution in the hot water system. The three way valve is controlled either by the boiler thermostat or by a room thermostat. You can switch via a lever between automatic and manual mode (AUTO / MAN).

Switch the lever to MAN when filling, venting and draining. Through the MAN position, the valve tappet is in the centre position. The water can then flow out to both outlets.



three way valve
Art. No. 10-J004

3.13 OPTIONAL: water heating via plate heat exchanger

Via the plate heat exchanger, the water in the boiler heats the cold fresh water, which is then available as heated water.

Water heating via a plate heat exchanger can be offered as an option for **models KB 40, KB 45, KB 50 and KB 75**.

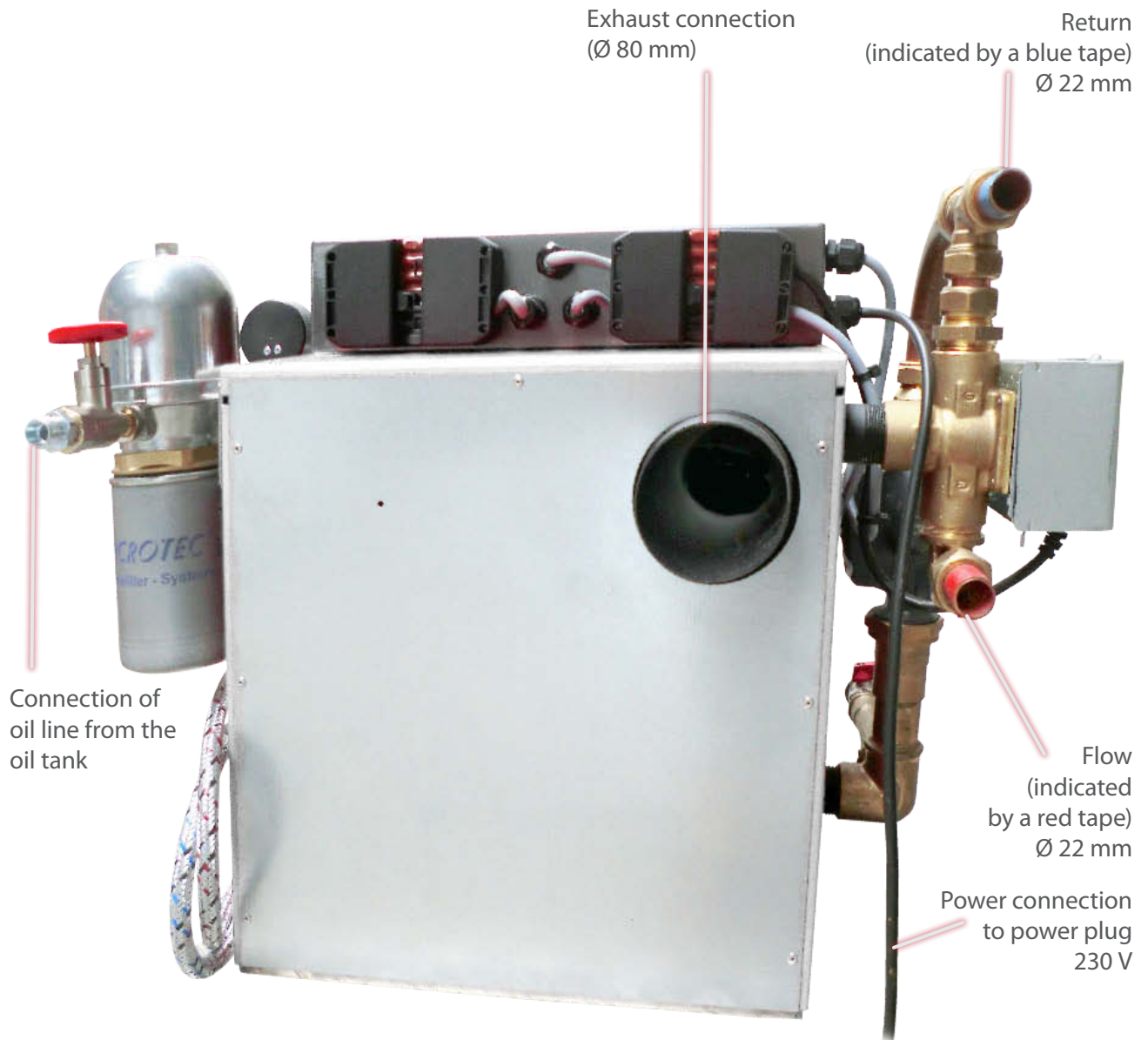
These models have the additional Combi e.g. **KB 40 Combi**.



4. Installation

This chapter describes the steps required for the installation. The commissioning is described in Chapter 5.

The connections of the KB series are labelled in the following figure:



4.1 KB-Series set up

⚠ WARNING **Danger of explosion!**

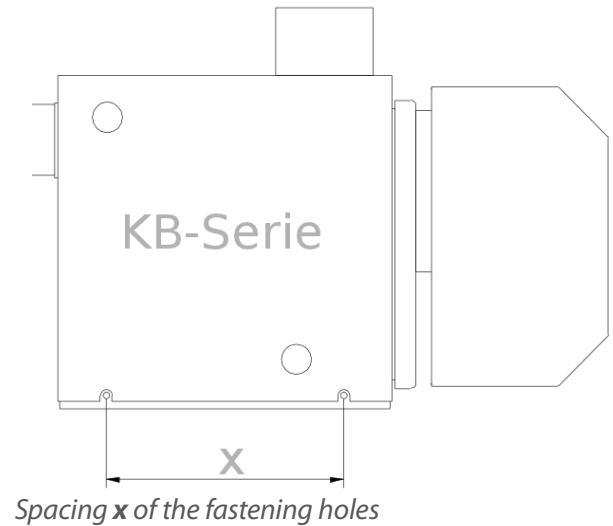
Do not store any flammable and / or gaseous substances in the installation of the KB series. That could lead to explosions through the flame in the burner. As a result, persons in the vicinity may be seriously injured.

- Place the KB series in a dry room.
- Watch out for a horizontal and stable surface.
- Ensure the proper ventilation of the room and burner (see section 4.2).
- Secure the KB series against slippage, for example with bolted angle profiles.
- Keep a minimum distance of 250 mm from the back wall for the exhaust system.
- Use a grounded 230 V outlet for connecting the KB series to the on-board power supply.

Use a grounded 230 V outlet for connecting the KB series to the on-board power supply.

The KB-series should be fixed on the base with four M5 screws. The spacing x is given depending on the model:

	KB 20	KB 40	KB 45	(KB 50)	KB 75
x [mm]	147	264	285	n.v.	345



4.2 Air supply

ATTENTION

- The burner achieves soot-free combustion only with sufficient combustion air.
- Ensure adequate air supply.

There are two possibilities for the supply of combustion air:

- external air supply through an air ventilation shaft when large air consuming devices (eg main engine, generators) are installed in the same room as the KB-Series.
- air supply dependent on ambient air, when there are no other air consuming devices in the installation room.

For ambient air dependent air supply, select a diameter for the room ventilation of about 2.5 times the diameter of the exhaust pipe:

KB 20 to KB 45	KB 50 and KB 75
50 mm exhaust pipe diameter	80 mm exhaust pipe diameter
125 mm room ventilation diameter	200 mm room ventilation diameter

Note that other air consuming devices in the installation room may require a larger diameter for the room ventilation.

SCHEER recommends an external air supply, in order to achieve sufficient air supply to the burner at all times. Only with sufficient combustion air does the burner reach the best exhaust emissions, soot-free combustion and highest efficiency.

The components of the external air supply from the air ventilation shaft are in the following order:

1. Connector for pipe at the air ventilation shaft
2. Pipe (rigid or flexible), minimum diameter 50 mm
3. Transition piece for any diameter compensation from flexible pipe to inlet manifold
4. Inlet manifold (connected with the centrifugal fan) with a 50 mm diameter for the pipe connection

Connect the individual components with matching hose clamps.

4.3 Exhaust gas routing

WARNING

- **Risk of burns!** The **exhaust gas** and accordingly the exhaust system is heated up to **220 °C (428 °F)**! Contact with skin can cause severe burns. Insulate throughout the exhaust system with heat resistant material, in areas reachable by body parts.
- **Danger of explosion!** If you include an **blocking device** in the exhaust system, it is then necessary to use a **contact switch** that is connected to the burner.

ATTENTION Risk of corrosion!

- The entire **exhaust system** must be made of **stainless steel** in order to withstand the high exhaust gas temperatures of up to 220 °C (428 °F) and corrosive ingredients of the exhaust gas.
- **Outdoors** the exhaust gas routing must be **double-walled**. Otherwise, condensate may form due to the rapid cooling.

HINT: Condensate may accumulate in the exhaust system when the exhaust gas temperature is low.

Emission-related information for the KB-Series		KB 20	KB 40	KB 45	KB 50	KB 75
Exhaust temperature	°C °F	170 - 220 338 - 428	150 - 210 302 - 410	145 - 205 293 - 401	145 - 200 293 - 392	140 - 190 284 - 374
Exhaust pipe connection-Ø at the boiler	mm	Ø 80				
Exhaust pipe-Ø	mm	Ø 50			Ø 80	
Muffler recommended		no			yes	

You can also use an existing exhaust gas routing. Should this have a larger exhaust pipe diameter than the required, drag a flexible exhaust pipe with the diameter required in the existing exhaust gas routing.

- The **components of the exhaust gas routing** are, starting from the boiler:
- Condensate collector, the lowest point of the exhaust system
- for 50 KB and 75 KB SCHEER recommends a silencer
- Exhaust pipe flexible or rigid (note the in the table specified exhaust pipe diameter)
- Through-hull and deck path, depending on the outlet direction of the exhaust gases
- for vertical outlet: double-walled chimney

The outlet of the exhaust gases can be passed vertically through a chimney or horizontally via a through-hull fitting.

- Use the **vertical outlet for sailing vessels and high-seas ships** as large heeling and water overflow may occur.
- Connect the exhaust pipe on the deck pass with the inner tube of the double-walled chimney.
- Install a rain protection cap at the end of the chimney to prevent the entry of water into the exhaust system.
- Use the **horizontal outlet for motor vehicles and vessels in inland waterways**. The heeling occurring here is much smaller than in the above situations.

Connect the exhaust pipe to a double walled through-hull at a sufficient height above the water line.

Install a gooseneck in front of the through-hull of the exhaust system. In doing so, you prevent the penetration of water into the exhaust system.

4.4 Water supply

ATTENTION

- The operating pressure must not be lower than 0.5 bar when cold or higher than 2.5 bar when warm.
- You can also fill the heating system with a suitable cooling fluid (pH 8.5) specifically designed for heating systems.

Pay attention to the following when installing the flow and return line:

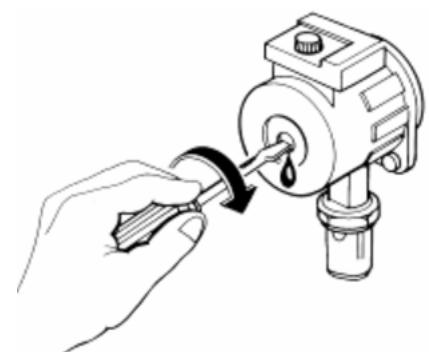
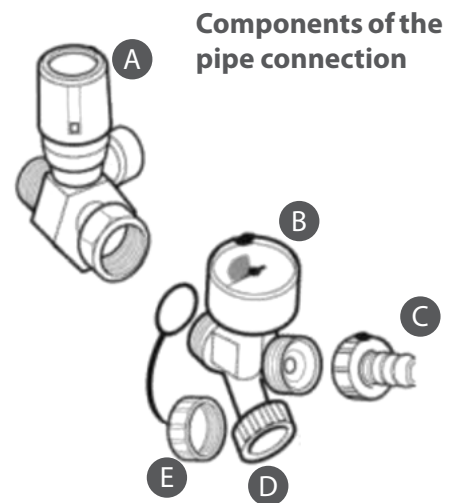
- The flow is marked with red tape and is under the return line (see the figure on page 12).
- The return is marked with blue tape and is located above the flow (see the figure page 12).
- Lay the lines so that the KB series remains accessible for maintenance.
- Ensure adequate ventilation of the boiler. Pay particular attention to areas where air can collect.
- Install a venting facility if the lines of the boiler do not go straight upwards.
- For the connection to the optional plate heat exchanger please refer to the manufacturer's instructions.

For the filling and venting of the heating system through the pipe connection, proceed as follows:

1. Make sure that the KB series is turned off
2. Remove the cover **E**
3. Connect the water hose with the supplied grommet **C**
4. Loosen the connecting nut **D**
5. Open the pipe valve **A**
6. Fill the system slowly with water until the system's pressure manometer **B** indicates a pressure of 2 bar.
7. Tighten the connecting nut **D**
8. Vent the heating system
9. If the water pressure has dropped, top up with water, until 2 bar are reached again.
10. Let the circulating pump run for about 5 minutes.
11. Turn off the circulating pump.
12. Check the water pressure. If the pressure has dropped, repeat the steps from step 6.
13. Disconnect again the water hose. The system is now filled.

Bleed the circulating pump as follows:

1. Make sure that the circulating pump is receiving power and turned on.
2. Check that the rotor of the circulating pump is free to rotate - to do this, turn the rotor by hand.
3. Loosen the screw on the front of the circulating pump with a slotted screwdriver by 1/2 to 1 turn.
4. Wait until only water comes out of the screw opening.
5. Tighten the screw again. The circulating pump is now air-free.



Venting the circulating pump

4.5 Oil supply



WARNING

Danger of explosion!

With improper installation of the oil bleeders it is possible that the explosions in the burner may result in serious injury of persons standing nearby !

- Attach the **oil bleeder** to the **designated holder** on the right side of the boiler (see illustration below). If this is not possible due to space limitations, mount the oil bleeder at least 30 cm higher than the oil pump.
- Install at least **50% of the oil line length ascending towards** the oil bleeder.

ATTENTION

The fault-free operation of the burner can only be guaranteed with clean, air-free oil .

- Pay attention to the **flow and return direction** when connecting the oil pipes. The flow directions are indicated by arrows on the oil pump and the oil bleeder.
- Use **oil filter and oil bleeder made of metal, only!** Plastic parts are not permitted for fire safety reasons.

The KB-Series are delivered with an oil filter-bleeder combination made of metal, in order to fulfil the fire safety regulations of the maritime sector. The allocated holder for the combination is located on the right side of the boiler.

If because of space issues you can not attach the combination to the holder, you can also position the combination otherwise.

However, you should mount the combination **at least 20 cm higher than the oil pump!** Otherwise, the automatic bleeder will not work properly, the oil will not be air-free and this will result to a burner malfunction.

Use for the **oil line between the oil tank and the oil filter**, only the following lines:

- Steel pipe or pre-oxidised copper pipe. SCHEER recommends a precision steel pipe (Ermeto-type fitting). For copper pipes, a support sleeve (made of brass) is mandatory.
- Inner diameter 6 mm
- Outer diameter 8 mm

If you use a longer line, it may result in accumulation of air in the oil line, which can hinder the flow of oil or lead to burner malfunctions.

A smaller line can be quickly damaged by external influences.

You should not use smaller line than the above mentioned.

The oil filter-bleeder combination mounted on the allocated holder, on the side of the boiler.

The oil filter-bleeder combination mounted on the allocated holder, on the side of the boiler.



4.6 Power connection



DANGER

Danger of electric shock!

- Electrical work on 230 V systems shall be performed only by qualified personnel!
- Make sure that the system is not live before you start connecting the KB series.

Check the following **prerequisites for the operation of the KB-series** on the on-board power supply:

- The 230 V power must have the same quality as the normal (onshore) mains-power.
- The power outlet used must be grounded.

Once these prerequisites are fulfilled, **you can connect the KB series:**

1. Insert the power plug of the control panel into the grounded power outlet.
2. Check with the service plug connector the correct phase polarity of the voltage (see section 5.1). Correct phase polarity is indicated by an illuminated indicator light.
3. If the indicator light of the service plug connector does not illuminate, turn the power plug around. Check that the indicator light is illuminated.

5. Commissioning



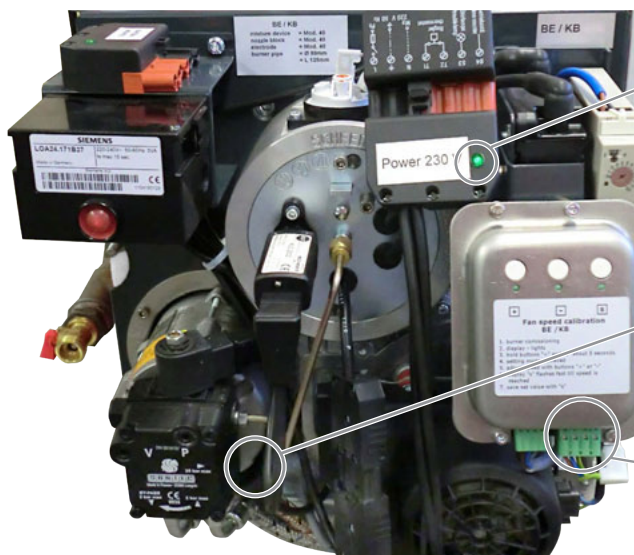
WARNING

Danger of explosion!

Explosions in the burner may result in serious injury of persons standing nearby!

- Make sure that the burner is fixed to the boiler in order to prevent the inflow of air into the combustion chamber and thereby to hinder explosions.
- Make sure that the oil bleeder is mounted on the side of the boiler in the provided holder.

5.1 OPTIONAL: Service plug connector for the testing and setup of the KB series



1 Once you connect the service plug connector for the fan and controller board to the burner plug, the indicator light illuminates when the voltage in-phase is. If the indicator light does not illuminate, turn the power plug by 180°.

2 If the oil supply is disrupted (e.g. tank is empty), you can fix this through the direct access to the oil pump motor and put it back into service.
Only allowed for small oil line lengths.

3 With a direct connection to the oil pump motor or fan motor, you can check the function of the oil pump motor and the oil pump and listen for sounds that indicate faulty bearings.



Service plug connector for the fan and controller board
Art.-Nr. 73010

5.1 OPTIONAL: Service plug connector for the testing and setup of the KB series (continued)

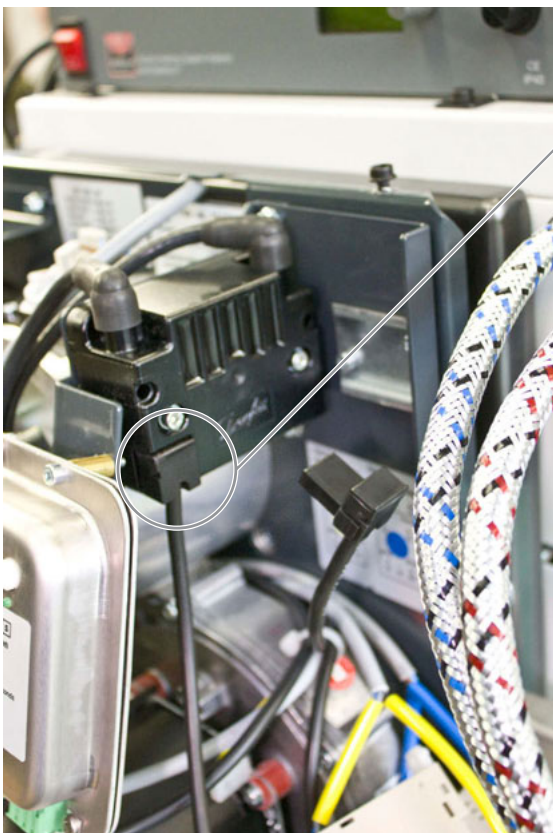


4

In case the fan controller does not allow a burner start-up because of a defect or excessive deviations in fan speed (see performance data on the burner), please connect the **service plug connector for the fan and controller board** on the fan and the controller board. You can now correct the fan speed on the control board and can also preset a new control board.



ATTENTION: The pug of the service plug connector connected on the fan should **ONLY** be upwards connected. The plug will also fit otherwise but the setup will not work and the fan (and possibly other parts) may be damaged.



5

Through the direct control of the ignition unit you can make the function of the transformer audible.

If you remove the mixing cartridge, and connect directly the ignition cable to the transformer, you can make the ignition spark visible.

5.2 Boiler temperature adjustment

Set the boiler temperature through the control panel. The control panel ensures the power supply to the burner, the circulating pump and the 3-way valve. Furthermore, a temperature sensor is also connected to the control panel and extends into the boiler thereby measuring the boiler water temperature.



Control panel
Art.-No. 51-001

Description of the elements on the control panel:

- A** Fuse holder with glass fuse 8A, 230V.
- B** Main switch
- C** Display for the status and temperature of boiler
- D** Adjustment knob for the boiler temperature
- E** Reset button for the limit thermostat.

The maximum boiler temperature is set using the adjustment knob D:

1. Press the adjustment knob **D** and turn it until the desired temperature is displayed on the display **C**
2. When released, the set temperature is stored and the display returns to the current boiler temperature.

The reset button **E** resets the limit thermostat.

The display shows the status of the boiler next to the boiler temperature:

Status	Description
1	Heat demand present
3	Post-running of the circulation pump is active.
4	Boiler is kept warm (hot water comfort at your disposal)
A	Low voltage

5.3 Ölversorgung überprüfen



WARNING

Danger of explosion!

Explosions in the burner may result in serious injury of persons standing nearby !

- Make sure that the burner is fixed to the boiler in order to prevent the inflow of air into the combustion chamber and thereby to hinder explosions.
- Make sure that the oil bleeder is stably mounted in the provided holder on the boiler. If this is not possible due to space limitations, mount the oil bleeder at least 30 cm higher than the oil pump. If the oil bleeder is not mounted higher than the oil pump, the oil can not be bled and this can result in explosions.

ATTENTION

The fault-free operation of the burner can **only be guaranteed with clean, air-free oil.**

1. Open the stop valve of the oil tank.
2. Open the stop valve of the oil filter.
3. Connect the service plug connector to the oil pump motor (see section 5.1).
4. Let the oil pump run for about 5 minutes. The oil is bled through the oil bleeder, without the burner running.
5. Check the underpressure between the oil bleeder and the oil pump with the built-in underpressure manometer. The system is running optimally in the underpressure range of 0 to -0.3 bar. SCHEER recommends a filter change for values between -0.3 and -0.5 bar. Even greater underpressure may cause malfunctions and an increased pump wear should be expected.
6. The oil pressure of the oil pump has already been set by SCHEER. It is not required to check for the oil pressure of the oil pump.
7. Remove the service plug connector from the oil pump motor.
8. Re-connect the genuine oil pump connector.

5.4 Abgaswerte messen und einstellen

ATTENTION

- It is essential to adjust the fan pressure during the initial commissioning!
- The default fan pressure is only an initial setting.
- **The CO₂ level is critical.** You can find the required CO₂ value on the burner.

1. Turn the burner on at the main switch of the control panel.
2. After a preheating time of the oil preheater, the burner goes into operation.
3. Turn the **burner on and off, 3 times in a row.** Always include the post-purge period of 120 s! By switching ON and OFF, any air is removed from the nozzle head.
The air can lead to fluctuations in throughput and thus distort the measurement result.
4. Wait until the boiler has reached a **minimum temperature of 60 °C (140 °F).** The boiler is then in steady condition.
5. Connect the **flue gas analyser** to the measurement port in the exhaust system behind the boiler.
6. Adjust the fan speed using the fan controller board:
 - a. Hold down the + and S buttons for approximately 5 s
 - b. Indicator + flashes and indicator S illuminates
 - c. Adjustment mode can be now accessed
 - d. Adjust the fan speed by pressing + or -. Pay attention to the measured CO₂ value.
The required CO₂ level is indicated on the burner.
 - e. Indicator S flashes fast until the speed adjustment is completed.
 - f. Save the set value by pressing the S key.
 - g. Indicator + illuminates, operating setting completed
7. Close carefully the measurement port after the analysis.

The adjustment of the fan speed and thereby the adjustment of the CO₂ value is also described on the controller board.



Controller board, with the description of the fan speed adjustment

6. Maintenance

⚠ CAUTION

- **Risk of slipping** due to leaking or dripping oil. Wipe or collect the oil.
- **Possible skin irritation** from contact with oil. When working with oil wear safety gloves.
- **Possible respiratory irritation** due to dust inhalation while cleaning boiler. Ensure sufficient ventilation.

ATTENTION

- Use only genuine spare parts. These are specially designed for the KB series. With the use of other replacement parts no warranty (statutory liabilities and rights) can be given and the guarantee expires.
- When placing an order please indicate the model and serial number of your KB-Series. These can be found on the right side of the boiler and the burner.
- In Chapter 13, you can find an exploded view of the KB series and the spare parts list.

	Maintenance interval
Condensate collector	occasionally
Boiler cleaning	every two years
Burner maintenance	every two years
Control the exhaust emissions	every two years
Oil filter replacement	recommended when the underpressure manometer indicates underpressure greater than -0.3 bar
Fan cleaning	after some years of operation

Prepare the KB-Series for the **maintenance** as follows:

1. If the burner is in operation, cancel the heat demand.
2. Wait for the post-purge period with a 120 s duration.
3. Turn off the KB-Series with the main switch on the control panel.
4. Disconnect the plug from the 7-pin connector to the burner. The power supply of the burner is now interrupted.
5. Disconnect the plug of the control panel from the power outlet. The power supply of the boiler is now interrupted.
6. Dismantle the burner including the burner door from the boiler. To do this you should unscrew the door knobs.
7. The steps for cleaning the boiler and for the burner maintenance, are shown in the following sections.
8. After the cleaning, mount again the burner to the boiler.
9. Proceed with the recommissioning as described.

6.1 Control the Condensate collector

Check occasionally during the heating operation the condensate collector.

- Existing condensate indicates a faulty or inappropriate exhaust system (long ways, many turns) or inadequate insulation.
- Check the exhaust gas routing and its insulation when condensate is present in the condensate collector. Dispose of the condensate in an environmentally friendly manner.

6.2 Boiler cleaning

ATTENTION Risk of corrosion!

Do not use for cleaning any aggressive liquids such as thinner or gasoline! These attack the material and can lead to corrosion.

A well-adjusted burner has a soot-free combustion. Because of that, the effort of cleaning the boiler is low.

A **thin, clear layer** can be formed in the combustion chamber. This is a sign of a good combustion.

Do not remove this layer mechanically, because it acts as a preservative for the combustion chamber.

After you have removed the burner from the boiler, follow the steps for the cleaning of the boiler. Pay attention to an adequate ventilation!

1. Remove the insulation on the front side of the boiler.
2. Brush the tubes with the plastic brush. Do not use a metal brush because you will produce steel fragments that will create corrosion in the exhaust system.
3. Sweep the combustion chamber with the cleaning brush.
4. Sweep the front side of the boiler with the cleaning brush or a hand brush.
5. Vacuum any loose dust with a vacuum cleaner.
6. Reattach the insulation.
7. Mount the burner to the boiler.



Cleaning kit (plastic brush, cleaning brush)

6.3 Oil filter replacement

Change the oil filter and the filter cartridge only when the underpressure is too high.

If the underpressure displayed on the **underpressure manometer is greater than -0.3 bar**, this means that the oil filter is clogged and needs to be renewed:

- The system is running optimally in the underpressure range of 0 to -0.3 bar.
- SCHEER recommends a filter change for values between -0.3 and -0.5 bar.
- Even greater underpressure may cause malfunctions and an increased pump wear should be expected.

Change the oil filter change as described in the manufacturer's manual.

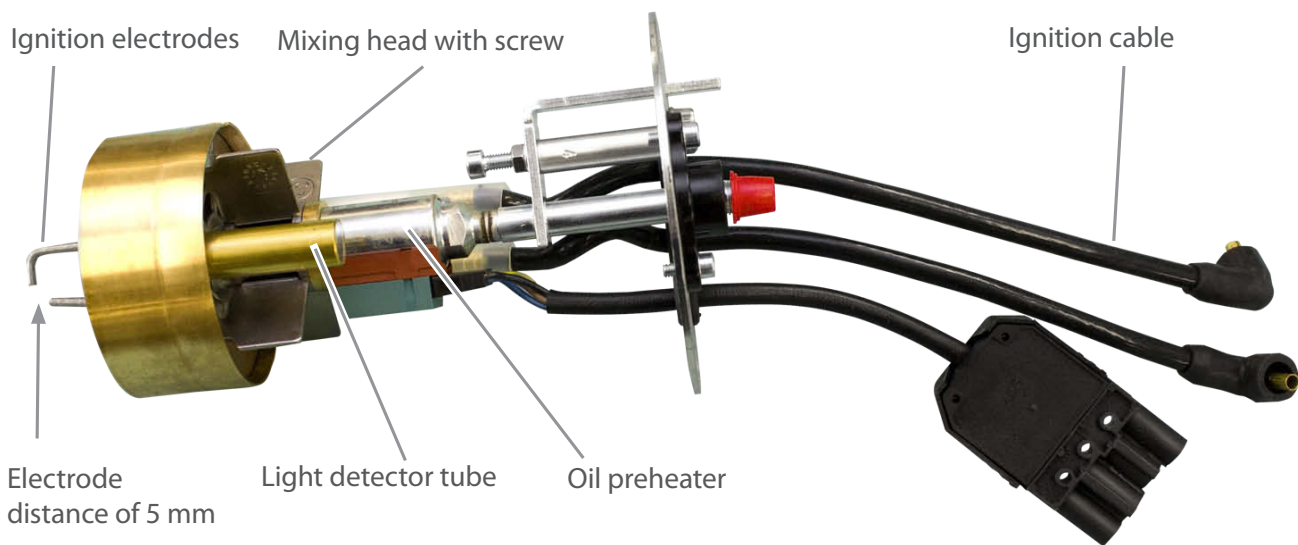
The oil filter should be made of metal, in order to meet applicable fire safety regulations.

Dispose of the oil filter and the filter cartridge in an environmentally friendly manner.

6.4 Control the mixing cartridge

Remove the mixing cartridge:

1. Remove the plug from the flame detector and remove the ignition cable from the ignition unit. The mixing cartridge is no longer connected to the rest of the burner.
2. Loosen the mounting screws of the mixing cartridge. Since this is a bayonet mount, you do not need to completely remove the screws.
3. Turn the mixing cartridge slightly to the left.
4. Drag the mixing cartridge towards you and out from the burner.



Mixing cartridge	Art. No.
KB 20	015380
KB 40	015382
KB 45	015383
KB 50	015384
KB 75	015385

Control the mixing cartridge:

1. Control the **light detector tube**. The flame detector monitors the flame through the light detector tube. Clean the glass surface of light detector tube, optionally with burner cleaner and a soft cloth.
2. Control the **ignition electrodes**. If these are burned or not properly placed in the holder, they should be replaced with genuine SCHEER ignition electrodes.
3. Check the distance of the **ignition electrodes**. The **distance between the ignition electrodes must be 5 mm**. If the distance is greater or smaller than the specified, they should be replaced with genuine SCHEER ignition electrodes. Do not turn the ignition electrodes! The electrodes could break.
4. Control the **oil nozzle**. If the nozzle is damaged or if deposits are present, it must be replaced. The nozzle replacement is described in the next section
5. Proceed with the installation of the mixing cartridge in the reverse order of its removal.

6.5 Replacement of the oil nozzle

ATTENTION Only use genuine spare parts!

The oil nozzles are specially designed for the KB burner. Therefore, only SCHEER oil nozzles are allowed. You can recognize the SCHEER oil nozzles from the designation SC. If you use other nozzles, it may result burner malfunction or burner failure.

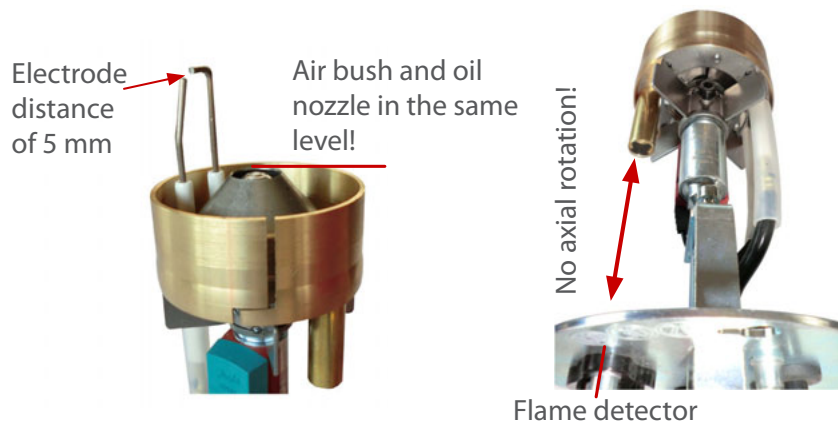
For the right oil nozzle please refer to the opposite table.

Take the oil nozzle from the packaging only directly before the insertion! The nozzle may otherwise be damaged.

	SCHEER oil nozzles	Art. No.
KB 20	0.18 - 80° SC	022276
KB 40	0.25 - 80° SC	022277
KB 45	0.40 - 60° SC	022368
KB 50	0.50 - 60° SC	022370
KB 75	0.65 - 60° SC	022373

Replace the oil nozzles in the following steps:

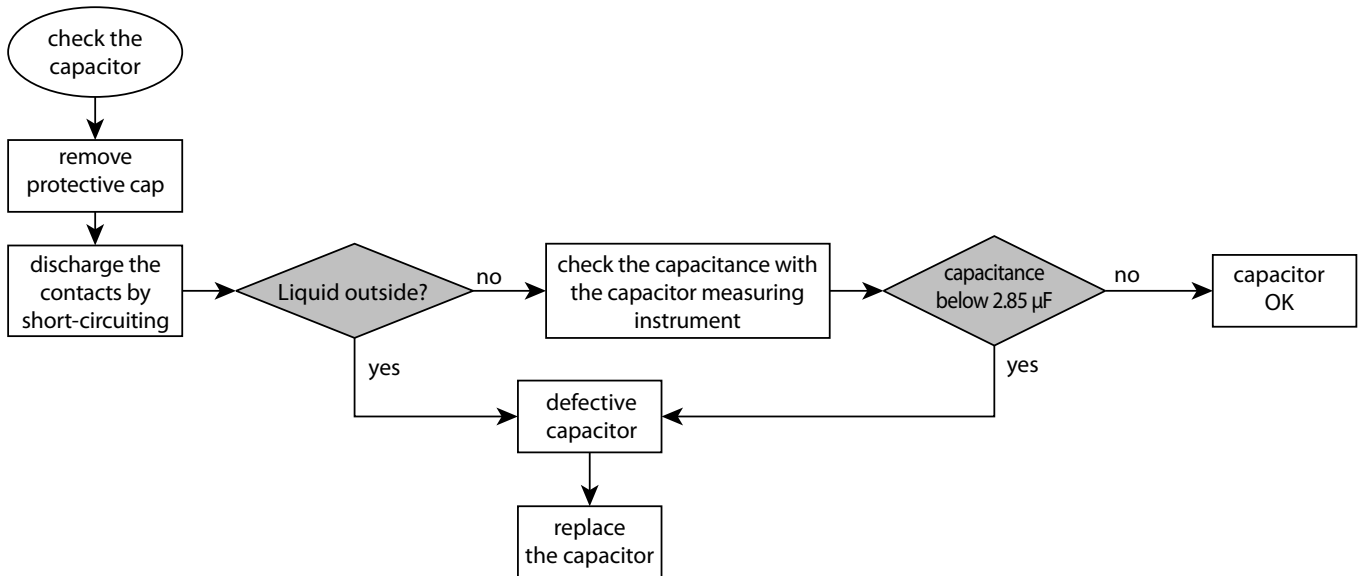
1. Loosen the screw of the mixing head. Pull the mixing head from the nozzle holder. The nozzle is now exposed.
2. Unscrew the old oil nozzles with a box-end wrench. If necessary, use a second box-end wrench to stabilise the nozzle holder. Do not use an open-end wrench or similar, as the oil nozzles or the nozzle holder could be damaged by the unequal stress.
3. Take the new nozzle from the packaging. Hold the oil nozzles only at the sides of the hexagon, so that they are not damaged.
4. Turn the new nozzle hand-tight with a box-end wrench. If necessary, secure the nozzle holder with a second box-end wrench. If the nozzle is tightened too hard, it may jam / tilt in the nozzle holder during the burner operation and may no longer be released without damage. In that case, a new mixing cartridge is required.
5. Mount the mixing head on the nozzle holder. The oil nozzles and the air bush must be in the same level. Do not use metal for placing! The metal may damage the nozzle. **The oil nozzles must not extend from the air bush.**
6. Make sure that the light detector tube and the flame detector are in a line. In case of an axial rotation there can be no flame detection and this results in a malfunction shut down.
7. Turn the screws of the the mixing head hand-tight. If you tighten the screws too tight, the nozzle holder deforms and the exact positioning of the mixing head is no longer possible.
8. Mount the mixing cartridge in the reverse order as the one described in the section „Cleaning the boiler“.



6.6 Check the capacitor of the oil pump motor

ATTENTION

Check the capacitor at every maintenance. If the capacitance deviates by more than 5 % (smaller 2.85 μF) then the capacitor has to be replaced. Otherwise, it may cause the motor to overheat, whereby its bearings may be destroyed.



6.7 Cleaning of the centrifugal fan

Accumulated dust may deteriorate the efficiency and smooth running of the centrifugal fan.

The fan should be therefore cleaned after a few years of operation:

1. Disassemble the fan
2. Clean the blades with compressed air
3. Reassemble the fan

6.8 Measure and adjust emission levels

1. Turn the burner on at the main switch of the control panel.
2. After a preheating time of the oil preheater, the burner goes into operation.
3. Turn the **burner on and off, 3 times in a row**. Always include the post-purge period of 120 s! By switching ON and OFF, any air is removed from the nozzle head. The air can lead to fluctuations in throughput and thus distort the measurement result.
4. Wait until the boiler has reached a **minimum temperature of 60 °C (140 °F)**. The boiler is then in steady condition.
5. Connect the **flue gas analyser** to the measurement port in the exhaust system behind the boiler.
6. The measured CO₂ value must correspond with what is stated on the burner.
7. If the measured CO₂ value deviates from the default value, set the emissions levels as described in Section 5.4 under point 6.
8. Close carefully the measurement port after the analysis.

7. Error diagnostics

In the table below you will find a list of problems, their possible causes and solutions. If you are confronted with faults that are not listed in the table, please contact us.

Fault	Possible cause	Possible remedy
Burner does not start	Disrupted oil supply	Bleed the oil filter
		Replace the clogged oil filter
		Fill the oil tank
	Disrupted power supply	Check the fuses
Check the power supply		
Burner stops immediately	Burner has gone into fault mode	Press the shutdown reset button on the burner (*)
	Contaminated flame detector	Clean the light detector tube
	Defective flame detector	Replace the flame detector
Burner pulsates at the start of operation	Faulty exhaust systems	Check the opening of the chimney
	Contaminated boiler	Clean the boiler
	Disrupted oil supply	- see above
	Defective oil nozzle	Replacement of the oil nozzle
Burner goes into fault mode		Press the shutdown reset button on the burner (*)
	Low Voltage	Spannung kontrollieren
	Check the voltage	- see above
Boiler not responding to thermostat	Bridge connected in the terminal box of the room thermostat	Remove bridge between T1 and T2
	Boiler thermostat incorrectly adjusted	Adjust correctly (55-90°C)
	Room thermostat battery is empty	Replace the battery
Water does not circulate (pumped)	Pump coupling is closed	Open the pump coupling
	Pump electrically disconnected	Electrically connect the pump
	The rotor of the pump is stuck	Move the rotor by hand

(*) The reset button must be pressed only 1 time. If the burner goes again to fault after pressing the reset button, there is a permanent fault on the burner. SCHEER recommends a maintenance as specified in chapter 6. In this manner you can quickly identify and fix the problems mentioned in the table.

8. Decommissioning & Storage

CAUTION

- **Risk of slipping** due to leaking or dripping oil. Wipe or collect the oil.
- **Possible skin irritation** from contact with oil. When working with oil wear safety gloves.
- **Possible respiratory irritation** when working with soot. Ensure sufficient ventilation.

ATTENTION

- Store this manual near the KB-Series, in order to enable a secure recommissioning.
- Clean the burner and the boiler thoroughly for the decommissioning. In case of insufficient cleaning, the boiler and burner will corrode.
- Dispose of the oil filter in an environmentally friendly manner. The ultra-fine filter clogs with resinified oil and is then no longer functional. You can continue to use the oil bleeder.
- Dispose of the boiler water in an environmentally friendly manner. The boiler water is contaminated with heavy metals and chemical additives and thus consists a chemical waste.

Perform the following work steps for decommissioning including storage of the KB-series:

1. Disconnect the KB-Series from power.
2. Close the valves for the oil supply on the oil filter.
3. Disassemble the oil pipes.
4. Disassemble the oil filter and the oil bleeder. Dispose of the oil filter in an environmentally friendly manner.
5. Seal the oil pump of the burner with sealing caps.
6. Disassemble the burner from the boiler.
7. Store the burner with the flame tube facing downwards. In this manner leaking oil can not enter the electrical system of the burner.
8. Clean the boiler (see cleaning the boiler).
9. Drain the boiler water.. Collect the boiler water in a suitable container. Dispose of the boiler water in an environmentally friendly manner.
10. Rinse the boiler with fresh water.
11. Fill the boiler with antifreeze The antifreeze remains in the boiler.
12. Seal the water connections of the boiler.
13. Store the boiler standing upright on a horizontal and stable surface. Store the boiler and the burner in a dry and dust-protected location.

8.1 Prolonged Inactivity

ATTENTION Risk of corrosion!

When unused for long periods (summer, winter), the KB-Series may be corroded by salt-laden air and flue gas residues.

- Clean thoroughly all parts that come in contact with exhaust gas (see Maintenance).
- By annually recurring prolonged Inactivity, the life expectancy of the KB series is significantly reduced because during every prolonged Inactivity the material corrodes.

SCHEER strongly recommends to keep the KB-Series standing upright all the year-round! Only so can the long-term operation of the KB-Series be guaranteed.

9. Transport

For the preparation of transport and the transport of the KB-Series please follow the following steps:

1. Disconnect the KB-Series from power.
2. Disconnect the oil supply.
3. Collect any leaking oil and wipe it off. Dispose of the oil and oil contaminated material in an environmentally friendly manner.
4. Disassemble the burner from the boiler.
5. Clean the burner and boiler (see see Maintenance).
6. Drain the boiler water.. Collect the boiler water in a suitable container. Dispose of the boiler water in an environmentally friendly manner.
7. Wrap the boiler and the burner with blankets (or the like) to prevent damage.
8. Transport the burner with the flame tube facing downwards.
9. Transport the boiler standing upright on a horizontal and stable surface. If an upright standing transport is not possible, you may also transport the boiler placed on its back.
10. Secure the burner and the boiler against slipping and overturning.

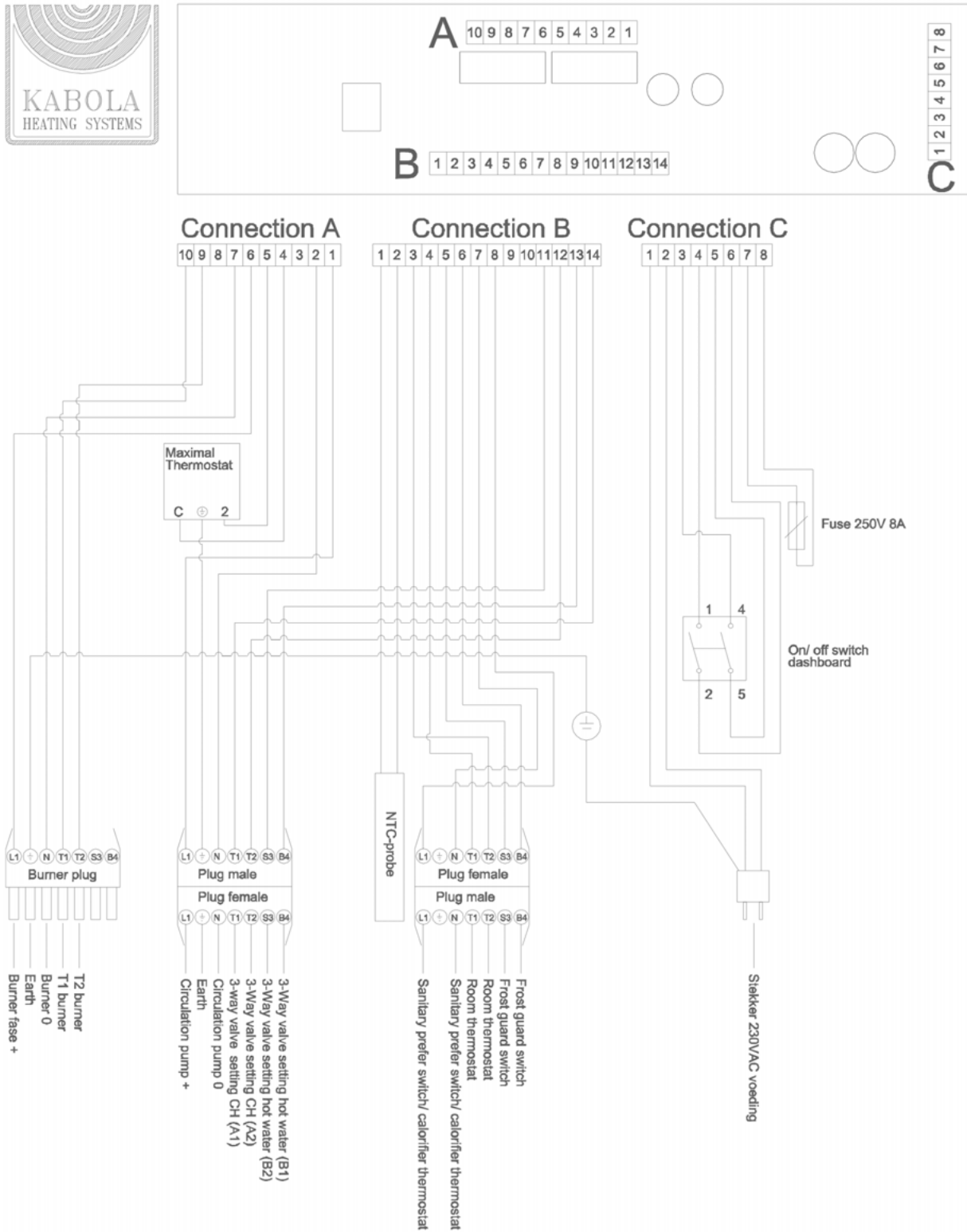
10. Disposal

Note the following points when disposing of the KB-Series:

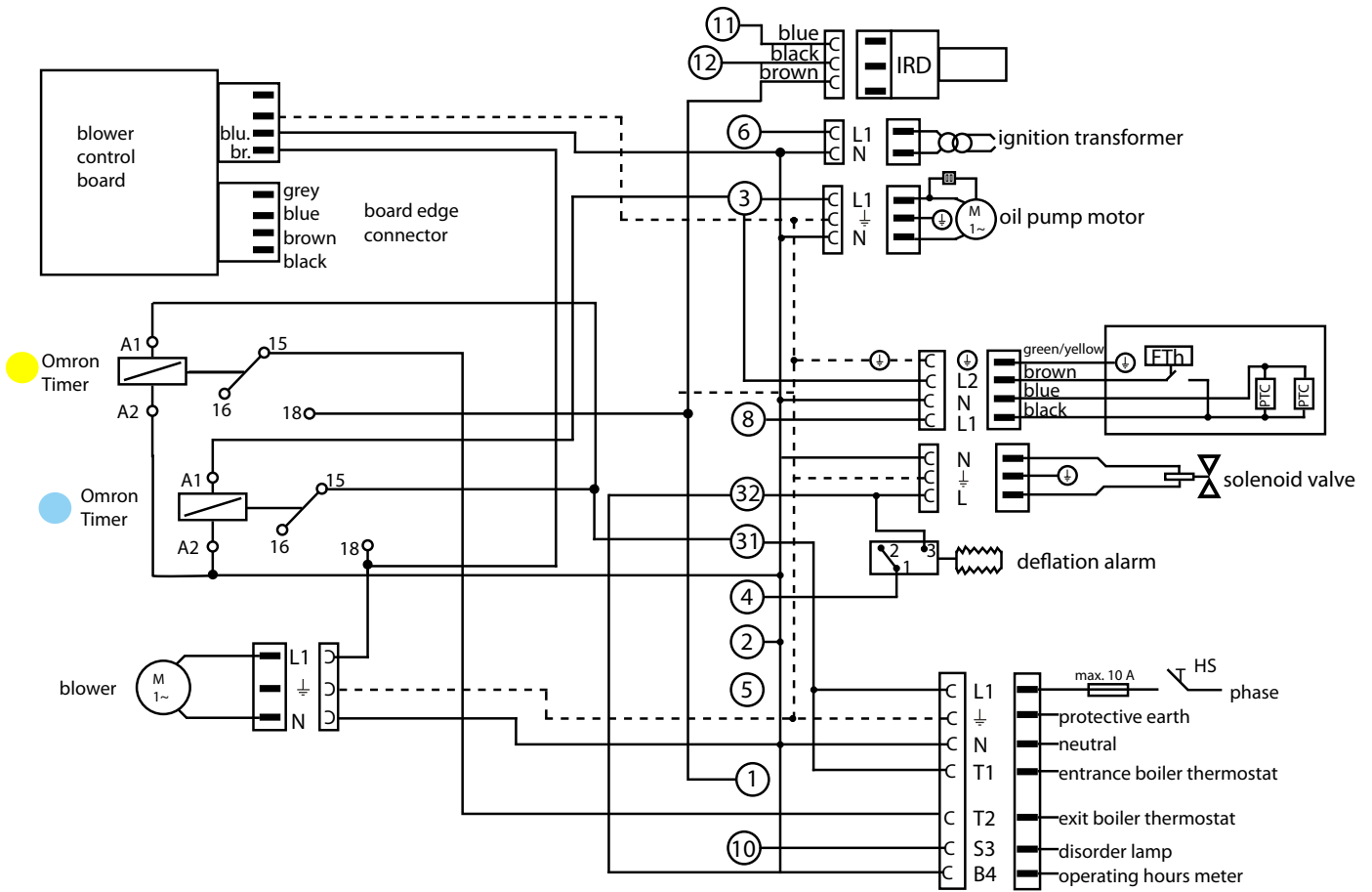
- Dispose of the parts of the combustion system in an environmentally friendly manner. All parts of the combustion system (oil filter, oil bleeder, oil pipes) and residual oil are chemical waste.
- Dispose of the boiler water in an environmentally friendly manner.
- Separate metal and plastic parts and dispose of them separately.
- This instruction guide should be disposed as waste-paper.

The recycling centre in your area can assist you with the environmentally friendly disposal of all material.

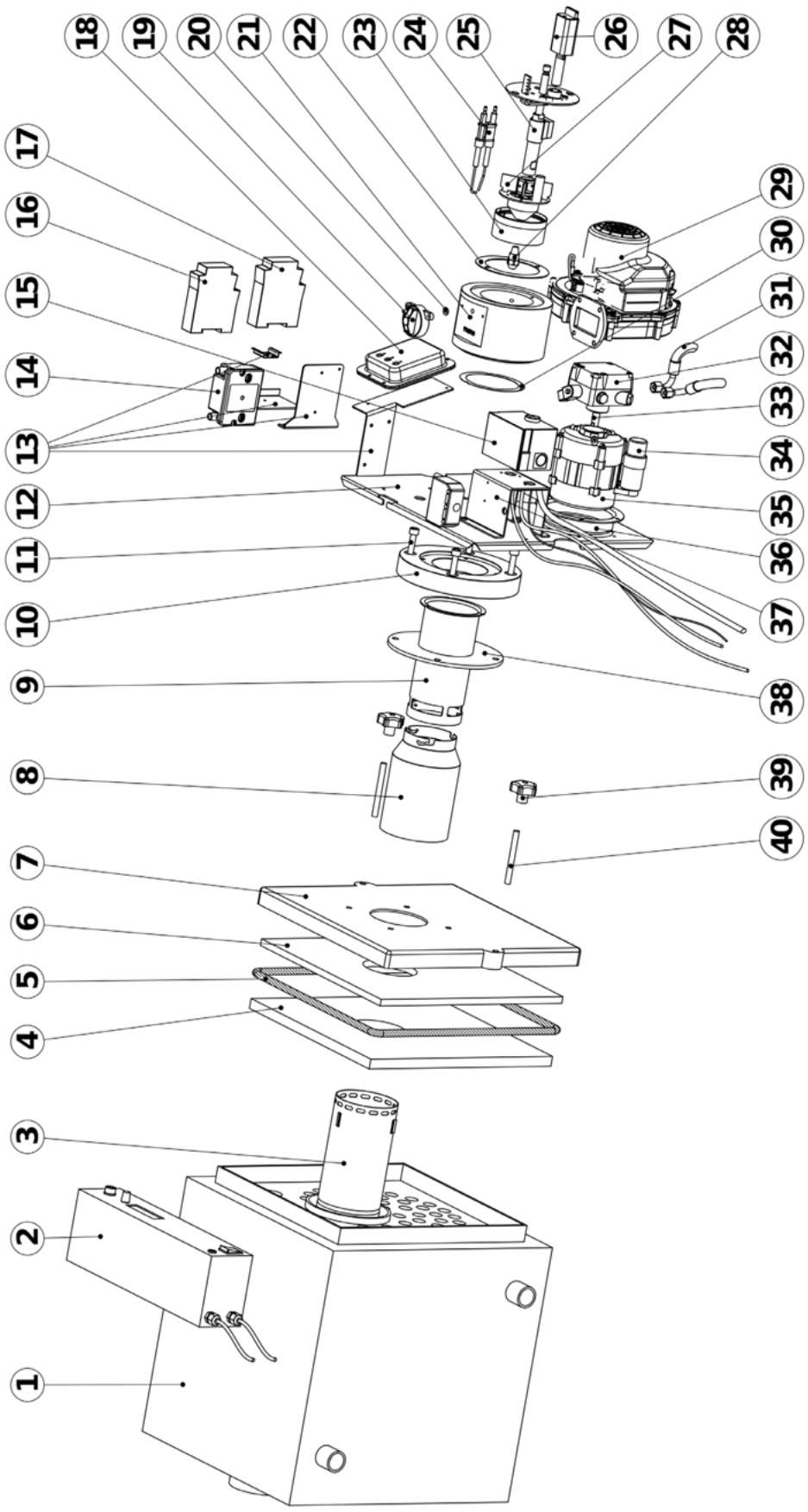
11. Circuit diagram of the control panel



12. Electrical circuit diagram of the Burner



13. Exploded view & parts list



Kabola Blue KB -Series

No.	Description	KB 20	KB 40	KB 45	KB 50	KB 75
1	Boiler KB complete	077980	077984	077987	077990	077993
2	Control panel	51-001				
3	Combustion chamber insert	not planned			-	
4	Boiler insulation	44-004	46-005	47-005		49-005
5	Door gasket cord	13-M084				
6	Door insulation for the boiler door gasket	44-003	46-004	47-004		49-004
7	Door	-				
8	Flame tube	015110			015114	
9	Adapter pipe Ø 80 x 1.5 x 109 mm	015179				
10	Ring adaptor	015967				
11	Fixing screws for the burner including washers	015365				
12	Support plate for burner components	015958				
13	Supporting plates for components for 17, 18, 34	015367				
14	Ignition Unit	010276				
15	Burner controller	020100				
16	Power-on delay timer (yellow)	070555				
17	Power-off delay timer (blue)	070553				
18	Controller board	015374	015376	015377	015378	015379
19	Air pressure switch	015180				
20	Ring seal for the air pressure switch	015181				
21	Burner block module (including 16 + 22)	015966				
22	Seal for nozzle holder holding plate	015172				
23	Dosage ring	015413				
24	Ignition electrode set with holder	015357			015358	
25	Nozzle holder complete set	015471		015472	015473	015474
26	Flame detector	020064				
27	Mixing device (including 23 + 24)	015380	015382	015383	015384	015385
28	SCHEER Oil nozzles	022276	022277	022368	022370	022373
29	Centrifugal fan (two-stage)	015112				
30	Ring seal for the adapter pipe	015170				
31	Oil line (2 pieces)	041411				
32	Oil pump	011236				
33	Motor clutch	010292				
34	Capacitor 3µF /100°C	010294				
35	Oil pump motor 70 Watt	015138				
36	Support plate for the oil pump motor	015366				
37	Distribution board Kabola (single-stage)	015968				
38	Burner flange seal	031430				
39	Door rotary knob KB-Series	-				
40	Bolts	-				
41	Circulating pump	9-I053				
42	Three way valve	10-J004				

Declaration of Conformity

We state in one's own responsibility that the product

Blautherm DUO BE - KB - Serie

is in conformity with the E. C. directive 89/336/E.E.C. relating to the Electromagnetic Compatibility.

This declaration is valid for all products which are produced in accordance with the technical documentation which is a part of this declaration.

For verification of conformity with regard to Electromagnetic Compatibility the following harmonized standards are applied:

- IEC 60092-504 (2002) Electrical installations in ships. Special features. Control and instrumentation
- IEC 61000-4-2 (2008) Testing and measurement techniques - Electrostatic discharge immunity test
- IEC 61000-4-3 (2010) Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test
- IEC 61000-4-4 (2011) Testing and measurement techniques - Electrical fast transient/burst immunity test
- IEC 61000-4-5 (2005) Testing and measurement techniques - Surge immunity test
- IEC 61000-4-6 (2008) Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields
- CISPR 16-2-1 (2008) Specification for radio disturbance and immunity measuring apparatus and methods - Part 2-1: Methods of measurement of disturbances and immunity - Conducted disturbance measurements
- CISPR 16-2-3 (2006) Specification for radio disturbance and immunity measuring apparatus and methods - Part 2-3: Methods of measurement of disturbances and immunity - Radiated disturbance measurements

SCHEER
Heating Systems & Production Technologies

A handwritten signature in blue ink that reads "Schroeter".

Dipl.-Kffr. Nicole Schroeter
manageress

EG-Baumusterprüfbescheinigung

gemäß der Wirkungsgrad-Richtlinie von neuen
Warmwasserheizkesseln 92/42/EWG

EC Type Examination Certificate

according to the EC directive 92/42/EC
efficiencies of new hot water boilers



Systems

Produkt-ID-Nummer

Product ID-number

CE-0045CMKD 2350

Hersteller / Vertreiber <i>manufacturer / distributor</i>	:	Kabola Heating Systems B.V. Placotweg 1, NL - 4131 Vianen (Utr.)
Produktart <i>product category</i>	:	Heizkessel mit integriertem Ölgebläsebrenner in DUO-Bauweise (Unit)
Handelsbezeichnung <i>trade mark</i>	:	Heizkessel für flüssige Brennstoffe
Bauart <i>construction type</i>	:	Niedertemperaturkessel
Typ, Ausführung <i>type, model</i>	:	KB... (Typenliste s. Seite 2)
Prüfgrundlagen <i>basis of type examination</i>	:	Richtlinien 92/42/EWG, DIN EN 304:06/1998 und DIN EN 267:09/1999
Prüflaboratorium <i>laboratory</i>	:	TÜV NORD Systems GmbH & Co. KG Prüfstelle für Feuerungsanlagen
Überwachung <i>surveillance procedure</i>	:	Prüfung der Konformität mit der zugelassenen Bauart nach Modul B, Anhang III der Richtlinie 92/42/EWG

Hannover, den 11. März 2011

(Der Leiter)

TÜV NORD Systems GmbH & Co. KG
Große Bahnstraße 31, D-22525 Hamburg
Tel: +49 (0) 4103 23-0 Fax: +49 (0) 4103 23-2000

TÜV NORD Systems GmbH & Co. KG

Beschriftung des Herstellers ist durch die TÜV NORD-Prüfung bestätigt.
Die Überwachungs- und Prüfungsstelle liegt bei der Landesagentur
für Energieeffizienz



Installation and operating instructions for the KB-series

Produkt-ID-Nummer : CE-0045CMKD2350
Product-ID-number

11.03.2011

Technische Daten
technical data

Typ / Ausführung type	Nennwärmeleistung (kW)	Brennstoffe *	Energieeffizienz
KB 20	6,0 bis 8,5	P	**
KB 30	8,5 bis 11	P	**
KB 40	10,5 bis 13	P	***
KB 45	13,5 bis 22,5	P	***
KB 50	19 bis 26	P	***
KB 75	26 bis 41	P	***

*) P = Öl / G = Gas P[†]) = Heizöl EL (schwefelarm)

Die Prüfergebnisse sind in den Berichten KD 2350 C1 – C6 vom 11.03.2011 zusammengefasst.

Die Kessel erfüllen die Wirkungsgradanforderungen für Niedertemperaturkessel für flüssige Brennstoffe im Sinne der Wirkungsgrad-Richtlinie 92/42/EWG.