

Providing sustainable energy solutions worldwide

Installation- and maintenance instruction

B 2

Table of contents

GENERAL	3	5. PUMP INSTRUCTIONS	18
Important to think about!	4	5.1 Suntec AS47CK	18
Safety instructions	4	5.1.1 Technical data	18
Warning	4	5.1.2 Components	18
Electrical safety	5	5.1.3 Filter replacement	18
Assembly and Service	5	5.1.4 One-pipe system	18
Condensation in the flue	5	5.1.5 Function AS47CK	19
Measures to increase the temperature	5	5.1.6 Suction pipe tables AS47CK	20
Adjusting the burner	5	5.1.6.1 Overhead Tank	20
1. TECHNICAL DATA	6	5.1.6.2 Underlying Tank	20
1.1 Dimensions B 2	6	5.2 Danfoss BFP41L3	21
1.1.1 Dimensions flanges	6	5.2.1 Technical data	21
1.1.2 Recommended nozzles and pressures	6	5.2.2 Components	21
1.2 Model B 2 KA / Model B 2 KAV	7	5.2.3 Venting	21
1.2.1 Burner output	7	5.2.4 Changing cartridge filter	21
1.2.2 Setting the ignition electrodes	7	5.2.5 BFP41L3 operating principle	22
1.3 Model B 2 KS 76/24 / Model B 2 KSV 76/24	8	5.2.6 Suction pipe tables BFP41L3	23
1.3.1 Burner output	8	5.2.6.1 Overhead Tank	23
1.3.2 Setting the ignition electrodes	8	5.2.6.2 Underlying Tank	23
1.4 Nozzle table, 8–15 bar	9	6. PREHEATER	24
1.4.1 Burner with preheater	9	7. ELECTRIC EQUIPMENT LMO1..2..4..	25
1.5 Description	10	7.1 Wiring diagram	25
1.5.1 Components	11	7.1.1 List of components	26
2. INSTALLATION	12	7.1.2 Function LMO1..2..4..	26
2.1 Acceptance inspection	12	7.1.3 Technical data	27
2.2 Preparations for installation	12	7.1.4 Colour codes LMO14/24	28
2.3 Distribution of oil	12	7.1.5 Fault codes LMO14/24	28
2.4 Electrical connections	12	8. FAULT LOCATION	29
2.5 Choice of nozzle	12	8.1 Burner will not start	29
2.6 Setting of the brake plate and air flow	12	8.2 Burner will not start after normal use	29
3. BASIC SETTINGS	13	8.3 Delayed ignition, burner starts; pulsation	29
3.1 Burner output without preheater B 2 KA / B 2 KS	13	9. DECLARATION OF CONFORMITY	30
3.1.1.1 Adjustment of the nozzle assembly	13	10. OIL BURNERS MAINTENANCE INSTRUCTIONS	31
3.1.1.2 Air adjustment	13		
3.1.1.3 Pressure in front of the brake plate	13		
3.2 Burner output with preheater B 2 KAV / B 2 KSV	14		
3.2.1.1 Adjustment of the nozzle assembly	14		
3.2.1.2 Air adjustment	14		
3.2.1.3 Pressure in front of the brake plate	14		
4. BURNER SERVICING	15		
4.1 Cleaning the fan wheel	15		
4.2 Trimming	15		
4.3 Automatic air damper	15		
4.4 Suspension of burner	16		
4.5 Removing the blast tube	16		
4.6 Brake plate	16		
4.7 Rubber cable	16		
4.8 Service position electric package	17		
4.9 Pump filter	17		

Important to think about!

Read this manual

- This manual should be taken into account by all who, for whatever reason, work with the apparatus and associated system parts.
- This manual is aimed specifically at authorized personnel.
- This manual should be viewed as a part of the burner and should always be kept close to the installation site.
- Enertech recommends that the burner be shut down when the oil tank is filled, and for six hours thereafter, to reduce the risk of blockages.

Safety instructions

The electrical installation must be carried out according to the high voltage provisions and be performed in a professional manner, so that the risk of oil leakage, fire or personal injury is avoided

Warning

- The manual must be read before installation and start-up.
- This manual should be followed by anyone who for any reason performs work on the installation or its component parts.
- The manual is to be considered as part of the burner and must always be kept in the vicinity of the installation site.
- Ensure that the fresh air inlet to the room where the burner is located is always open.
- The burner may only be installed by authorized personnel.
- Check that the burner is suitable for the boiler type.
- The burner must be installed in accordance with local legislation regarding electrical safety and fuel supply.
- The burner is designed for oil viscosities ranged between 1.2 and 8.0 cSt at 20°C.
- The burner must be protected by at most a 10 A fast-blow or 6.3 A slow-blow fuse.
- No burner safety system may be disconnected.
- The installation engineer must ensure that the boiler room is supplied with sufficient fresh air in accordance with local standards.
- Cut the power and shut-off the fuel supply before performing service.
- Enertech recommends that the burner be shut down when the oil tank is filled, and for six hours thereafter, to reduce the risk of blockages.
- The external temperature of the burner's component parts may exceed 60°C.
- Ensure that the burner is protected from water spills, as its design will not withstand such.
- Oil filters should be used.
- Only use spare parts recommended by Enertech.



Electrical safety

- If any electrical connections are made other than those recommended by Enertech, there is a risk of personal injury and equipment damage.
- The electrical installation must be carried out according to the high voltage provisions and be performed in a professional manner, so that the risk of oil leakage, fire or personal injury is avoided.
- The installation engineer must be especially careful to ensure that no electrical wiring or oil lines are pinched or damaged during installation or service



Assembly and Service

- If the boiler is equipped with an inspection hatch, the hatch should be fitted with an interlock.
- Filters must be fitted to the oil supply line.
- Shut-off cocks must be fitted to the oil supply line.
- Oil lines must adhere to the current national standards of each respective country.

Condensation in the flue

- A modern burner works with lower surplus air and also often with smaller nozzles than older types. This raises efficiency but also increases the risk of condensation in the flue. The risk increases if the cross section of the flue channel is too great. Flue gas temperatures should be above 60°C measured 0.5 m from the flue chimney.
- If the burner is used together with a condensing boiler, working condensing, the installation must have a chimney that manages this type of operating conditions.

Measures to increase the temperature

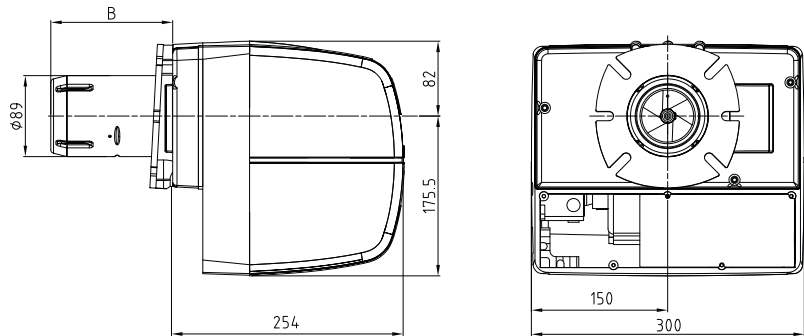
- Insulate the flue in cold loft space.
- Install an insert flue.
- Install a Dragex draught stabilizer or equivalent (which dries and entilates the flue during shutdown periods).

Adjusting the burner

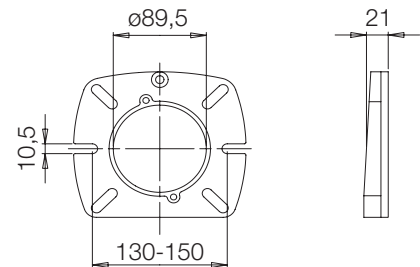
In order to achieve correct adjustment flue gas analysis and temperature measurements must be carried out. Otherwise there is a risk of soot build-up, poor efficiency or condensate precipitation in the flue.

1. TECHNICAL DATA

1.1 Dimensions B 2



1.1.1 Dimensions flanges



1.1.2 Recommended nozzles and pressures

Because of the different types of boiler in existence, with varying furnace geometries and furnace loads, it is not possible to commit to any given spray angle or spray pattern. Note that spray angles and spray patterns change with pump pressures.

Nozzle

60° Solid/Hollow cone

80° Solid/Hollow cone

Pump pressure

10 bar (8–14 bar) Light oil 1

10 bar (7–12 bar) Kerosene

1.2 Model B 2 KA / Model B 2 KAV

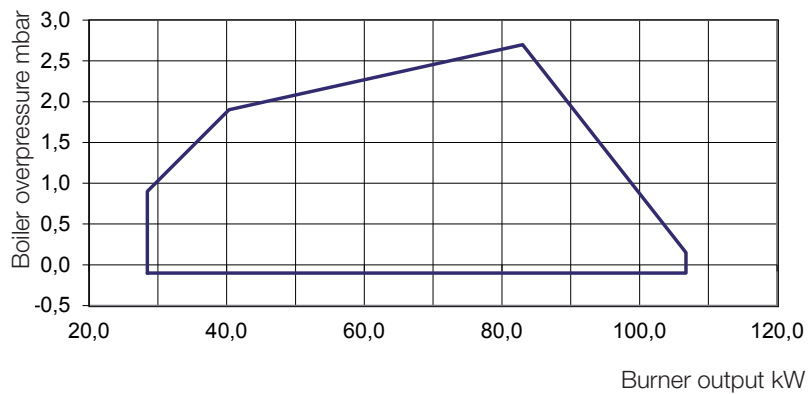


Length of blast tube mm	Protrusion from flange, measurement B mm
147	122
197	172

1.2.1 Burner output

2,4 - 9,0 kg/h

28,5 - 106,7 kW



1.2.2 Setting the ignition electrodes

Proper setting of the electrodes is essential to ensure satisfactory operation of the burner. If the spark hits the metal the efficiency will be lower and will also cause radio disturbance. There is also a risk that carbonisation will occur. Since the electrode pack is of the factory-set twin electrode type it will be necessary to bend the wires to make any adjustment.

1.3 Model B 2 KS 76/24 / Model B 2 KSV 76/24

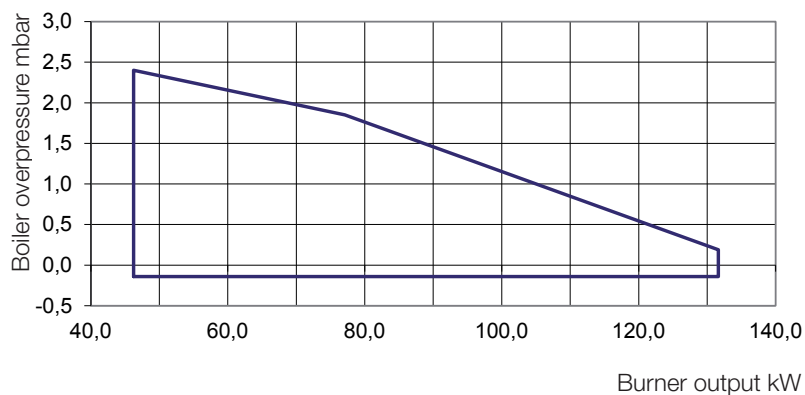


Length of blast tube mm	Protrusion from flange, measurement B mm
147	122
197	172

1.3.1 Burner output

3,9 - 11,1 kg/h

46 - 131 kW



1.3.2 Setting the ignition electrodes

Proper setting of the electrodes is essential to ensure satisfactory operation of the burner. If the spark hits the metal the efficiency will be lower and will also cause radio disturbance. There is also a risk that carbonisation will occur. Since the electrode pack is of the factory-set twin electrode type it will be necessary to bend the wires to make any adjustment.

1.4 Nozzle table, 8–15 bar

Pump pressure, bar

Gph	8		9		10		11		12		13		14		15	
	kg/h	kW	kg/h	kW	kg/h	kW	kg/h	kW	kg/h	kW	kg/h	kW	kg/h	kW	kg/h	kW
0,50	1,66	20	1,76	21	1,86	22	1,95	23	2,04	24	2,12	25	2,20	26	2,28	27
0,60	2,00	24	2,12	25	2,23	26	2,34	28	2,45	29	2,55	30	2,64	31	2,73	32
0,65	2,16	26	2,29	27	2,42	29	2,54	30	2,65	31	2,75	33	2,86	34	2,96	35
0,75	2,49	29	2,65	31	2,79	33	2,93	35	3,08	36	3,18	38	3,30	39	3,42	40
0,85	2,83	33	3,00	36	3,16	37	3,32	39	3,47	41	3,61	43	3,74	44	3,87	46
1,00	3,33	39	3,53	42	3,72	44	3,90	46	4,08	48	4,24	50	4,40	52	4,56	54
1,10	3,66	43	3,88	46	4,09	48	4,29	51	4,48	53	4,67	55	4,84	57	5,01	59
1,20	3,99	47	4,24	50	4,47	53	4,68	55	4,89	58	5,09	60	5,29	63	5,47	65
1,25	4,16	49	4,40	52	4,65	55	4,88	58	5,10	60	5,30	63	5,51	65	5,70	68
1,35	4,49	53	4,76	56	5,02	59	5,27	62	5,50	65	5,73	68	5,95	70	6,15	73
1,50	4,98	59	5,29	63	5,58	66	5,85	69	6,11	72	6,36	75	6,60	78	6,83	81
1,65	5,49	65	5,82	69	6,14	73	6,44	76	6,73	80	7,00	83	7,27	86	7,52	89
1,75	5,82	69	6,18	73	6,51	77	6,83	81	7,14	85	7,42	88	7,71	91	7,97	94
2,00	6,65	79	7,06	84	7,45	88	7,81	93	8,18	97	8,49	101	8,81	104	9,12	108
2,25	7,49	89	7,94	94	8,38	99	8,78	104	9,18	109	9,55	113	9,91	117	10,26	122
2,50	8,81	99	8,81	105	9,29	110	9,74	116	10,18	121	10,59	126	10,99	130	11,38	135
2,75	9,39	111	9,96	118	10,50	125	11,01	131	11,50	136	11,97	142	12,42	147	12,86	153

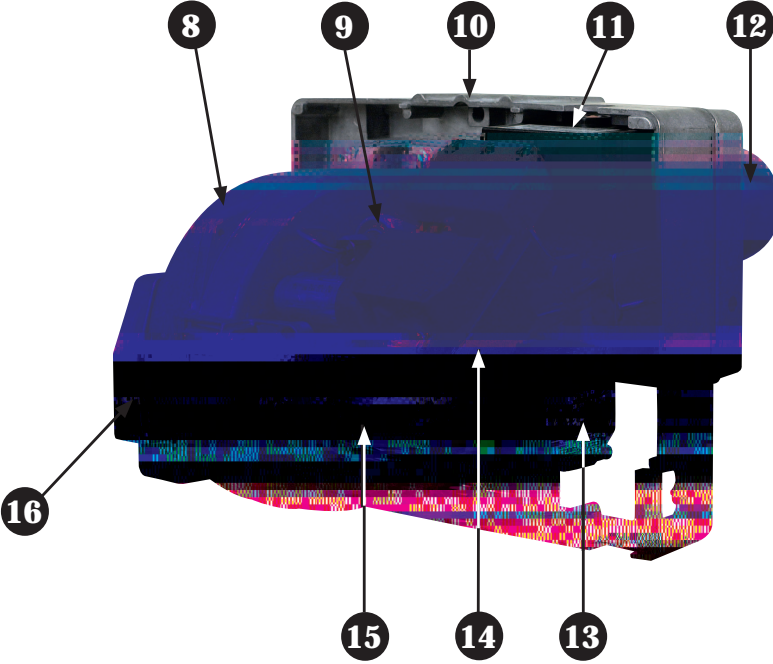
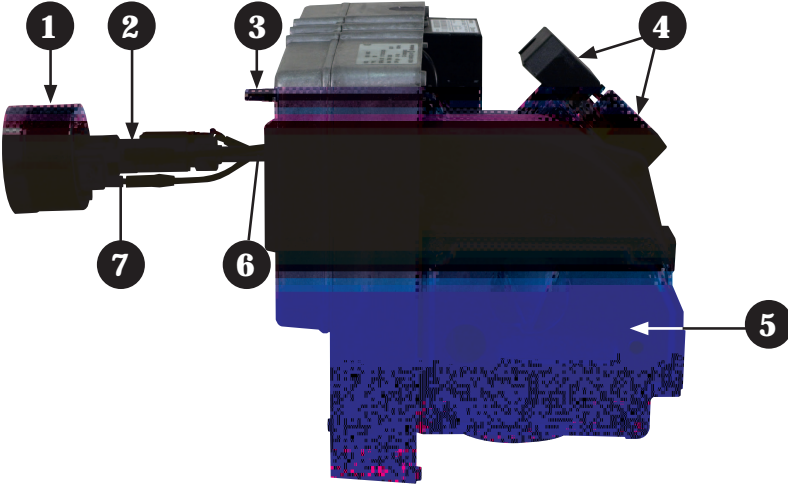
The table applies to oils with a viscosity of 4.4 mm²/s (cSt) at a density of 830 kg/m³ (Light oil).

1.4.1 Burner with preheater

Allow for a reduction in oil quantity of 5–20% with preheating owing to:

- Temperature increases at the nozzle.
- Nozzle design.
- Capacity (the higher the capacity the lower the difference).

1.5 Description



1.5.1 Components

1. Brake plate
2. Preheater
3. Photoresistor
4. Electric contact X1,X2 (see wiring diagram)
5. Air damper
6. Oil pipe
7. Electrodes
8. Fan housing
9. Adjustment of nozzle assembly
10. Frame
11. Control box
12. Blast tube
13. Oil pump
14. Ignition transformer
15. Motor
16. Air adjustment
17. Fan wheel
18. Fan housing, part



2. INSTALLATION

2.1 Acceptance inspection

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

2.2 Preparations for installation

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

2.3 Distribution of oil

To ensure satisfactory operation it is essential that the oil distribution system is correct. Observe the following:

- See Pump instructions for choice of tube diameter, tube length and height difference.
- Fix the tubing with a minimum number of screw fittings.
- Fix the tubes so that the oil hoses are not subjected to tensile stress or sharp bending when swinging out the burner or removing it for service.
- Fit the oil filter so that the filter cartridge can easily be replaced, see Oil filter Bentone.

2.4 Electrical connections

The main power switch must be turned off before beginning the electrical installation. If the boiler has a 7-pole contact device type Eurostecker it will most often fit the burner direct. Otherwise use the accompanying contact device. The operating thermostat and maximum thermostat, and also any fire-door switch, can then be connected in series with the incoming phase or be connected between T1 and T2. In the first case T1 and T2 are to be strapped.



If another electrical connection is used than the one recommended by Bentone, there might be a risk of material damage or personal injury.

2.5 Choice of nozzle

See under Technical Data: Recommended nozzle and table of nozzles.

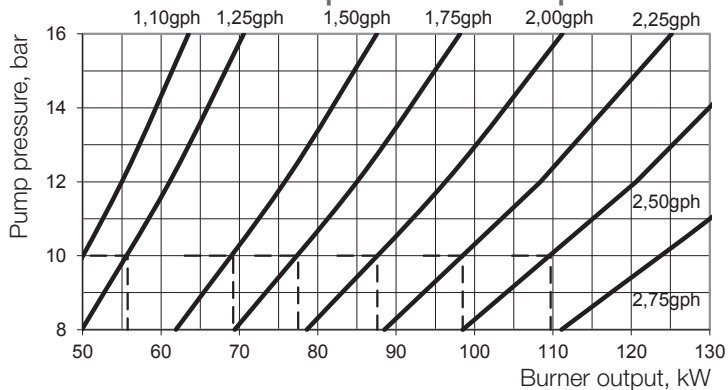
2.6 Setting of the brake plate and air flow

The burner is pre-set on delivery in relation to the nozzle provided. If the size of the nozzle is changed the burner can be initially set according to "Basic settings". Note that it is only a question of a basic setting that should be trimmed when the burner is started. This should include a fluegas analysis and measurement of soot.

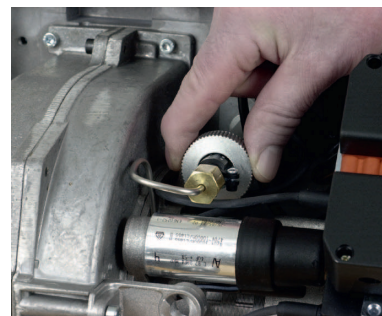
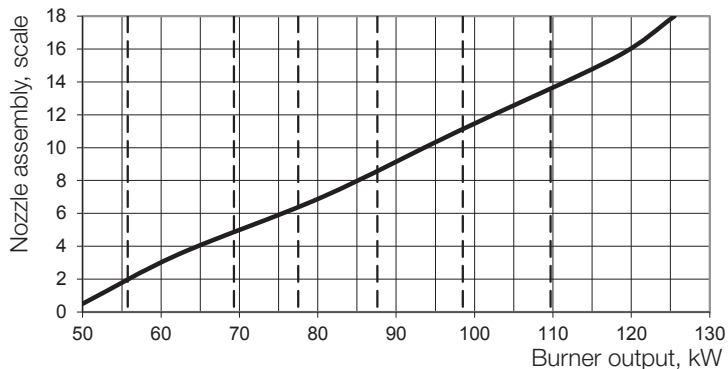
3. BASIC SETTINGS

Nozzle

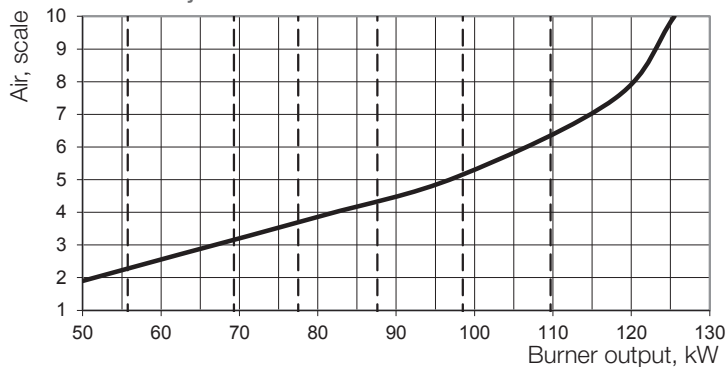
3.1 Burner output without preheater B 2 KA / B 2 KS



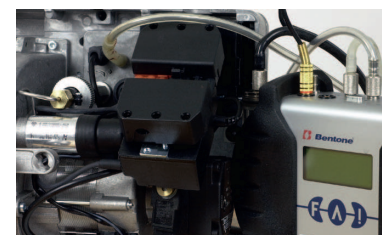
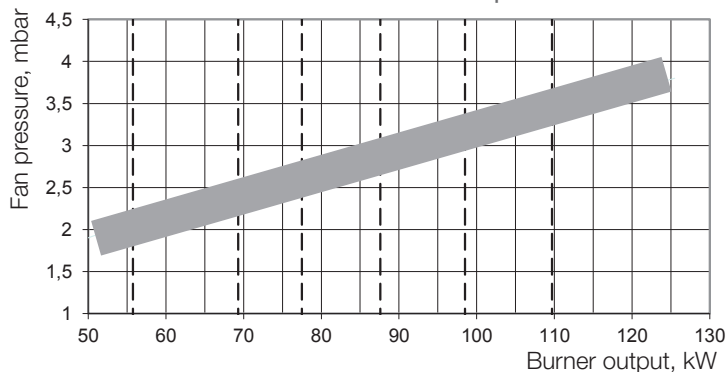
3.1.1.1 Adjustment of the nozzle assembly



3.1.1.2 Air adjustment

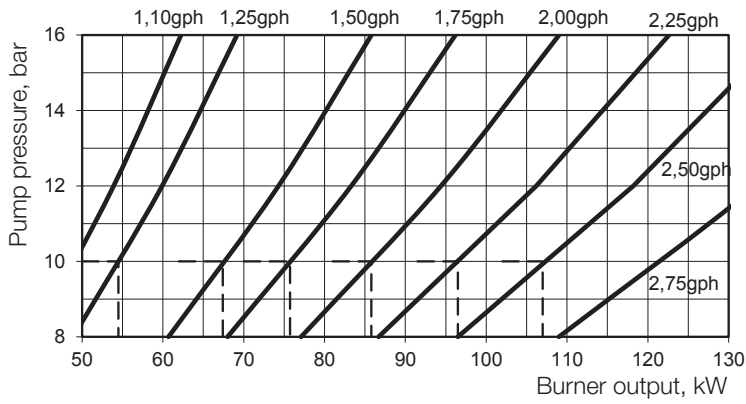


3.1.1.3 Pressure in front of the brake plate

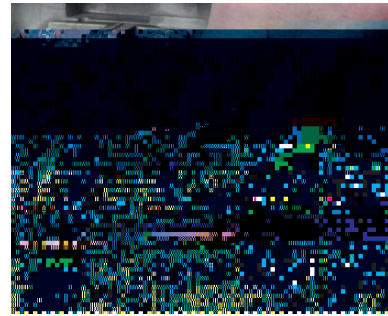
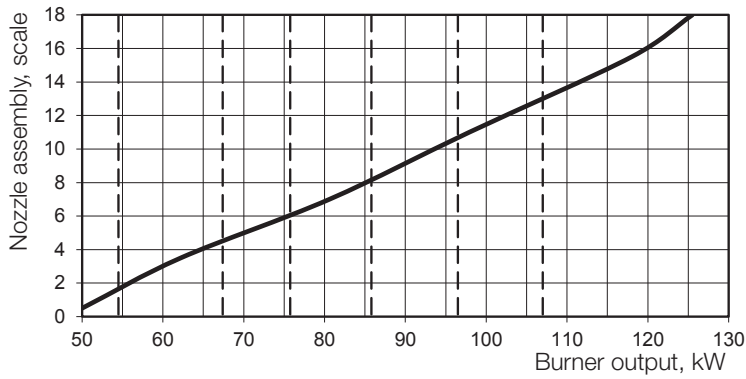


Nozzle

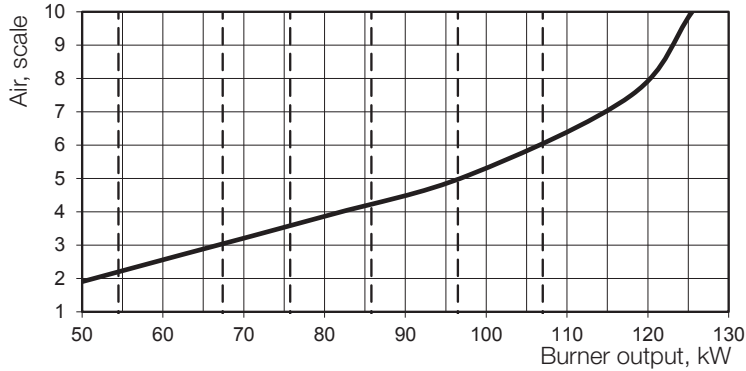
3.2 Burner output with preheater B 2 KAV / B 2 KSV



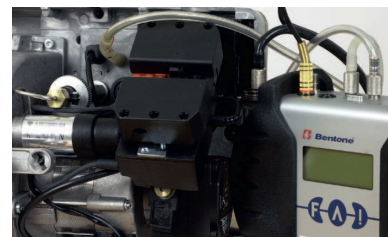
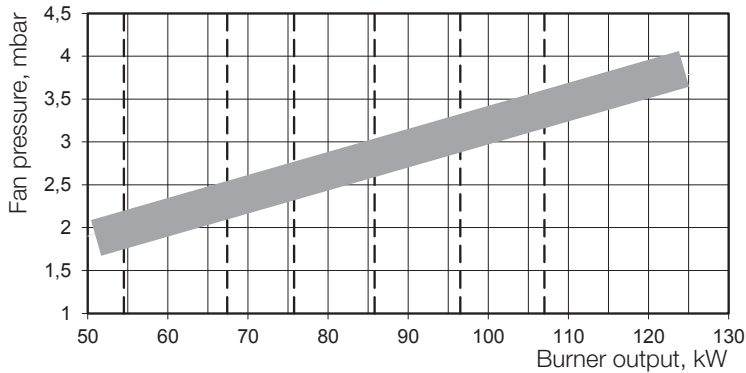
3.2.1.1 Adjustment of the nozzle assembly



3.2.1.2 Air adjustment



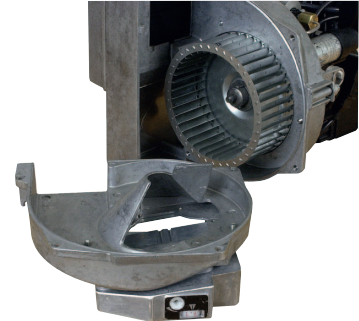
3.2.1.3 Pressure in front of the brake plate



4. BURNER SERVICING

4.1 Cleaning the fan wheel

The outer fan housing half is kept firm by 5 screws.



4.2 Trimming

If the size of the nozzle is changed, it is suitable to first set the nozzle assembly and air according to the recommendations in section Basic settings. For the individual boiler installation, adjustments can then always be made to optimise economy, operational reliability and environmental effects. The most important instruments for the task are one instrument for flue-gas analysis and a soot meter.

The principle of the adjustment is:

- reduce the air, either with the air regulation or the nozzle assembly, until a soot coefficient 0.5–1 is achieved.
- increase the air to give a safety margin of 0,5-1% CO₂ before soot is created. To throttle more with the shrouded disc (smaller reading on the nozzle assembly scale), gives a short, more bluish flame and often better combustion, but if one goes too far there will be starting problems. Throttling less with the shrouded disc gives a longer and more yellowish flame and can give a smoother start.

The pressure in front of the shrouded disc can be utilised as an aid in the adjustment. Recommended pressure, see under Basic settings. Remember to refit the rubber gasket on the pressure outlet after making the adjustments.



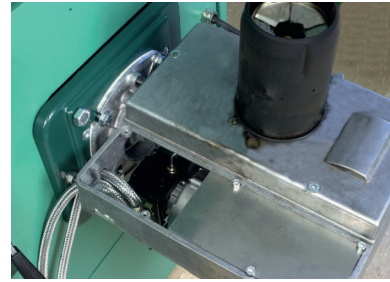
4.3 Automatic air damper

Remove the blast tube. Unscrew the 3 screws holding the cover on the back of the burner. Check that the air damper is moving easily.



4.4 Suspension of burner

During service the burner can be hung up on the screw in the burner flange. For this there is a hole on the right side of the burner. The blast tube, shrouded disc, nozzle and electrodes are then easily accessible.



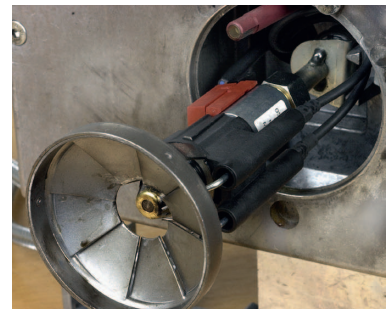
4.5 Removing the blast tube

1. Loosen the two fastening screws one turn.
2. Turn to the right and withdraw the blast tube.



4.6 Brake plate

The preheater plug and the electrodes shall be placed on either side of the oil tube. If there is a hole in the brake plate it shall be placed upwards to increase the light towards the photoresistor.



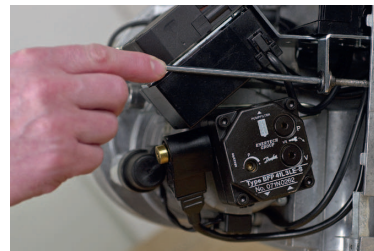
4.7 Rubber cable

Check that the rubber cable inlet is properly fixed in order to avoid unnecessary air leakage.

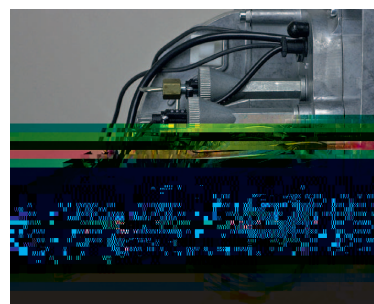


4.8 Service position electric package

Loosen the hexagon nut from the stud bolt. Pull the electric package backwards and rotate it ca. 90° clockwise.

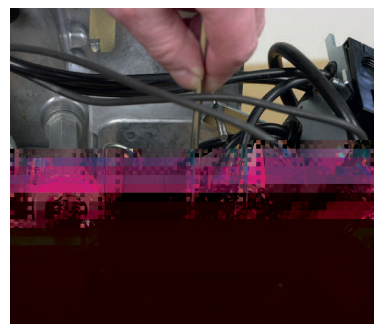


When required the electric package can be suspended in the cables.



4.9 Pump filter

When changing pump filter, see chapter 06.



5. PUMP INSTRUCTIONS

5.1 Suntec AS47CK

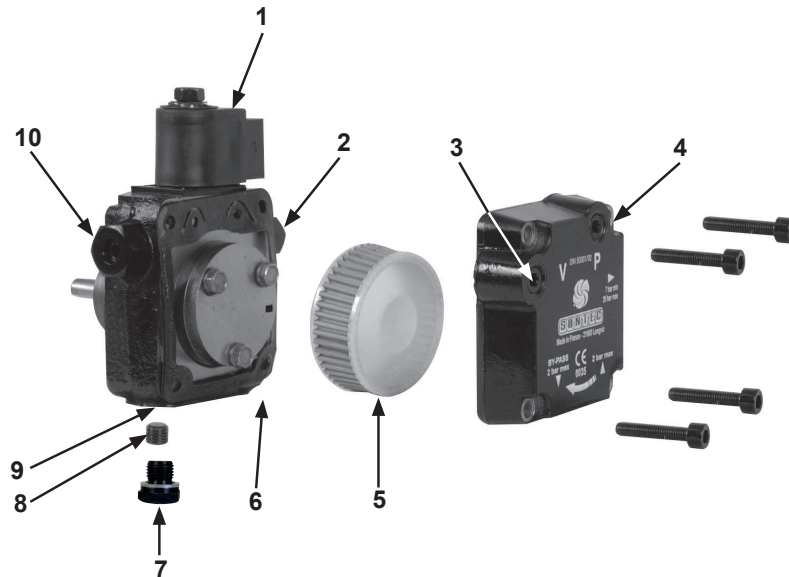
5.1.1 Technical data

Viscosity range:	1,0–12,0 mm ² /s
Pressure range:	7–12 bar
Oil temperature:	max. 60°C

5.1.2 Components

1. Solenoid valve
2. Nozzle connection G 1/8"
3. Vacuum manometer connection G 1/8"
4. Manometer connection G 1/8"
5. Filter
6. Suction line G 1/4"
7. Metal plug G 1/4"
8. Return plug
9. Return line G 1/4"
10. Pressure regulation

5.1.3 Filter replacement



Cut off the power and shut off the oil.

Remove the pump cover with the aid of a 4 mm Allen key. If necessary a screwdriver may be used between the cover and the housing to carefully pry the cover loose. Replace the old filter by a new one. Replace the cover, tighten lightly.

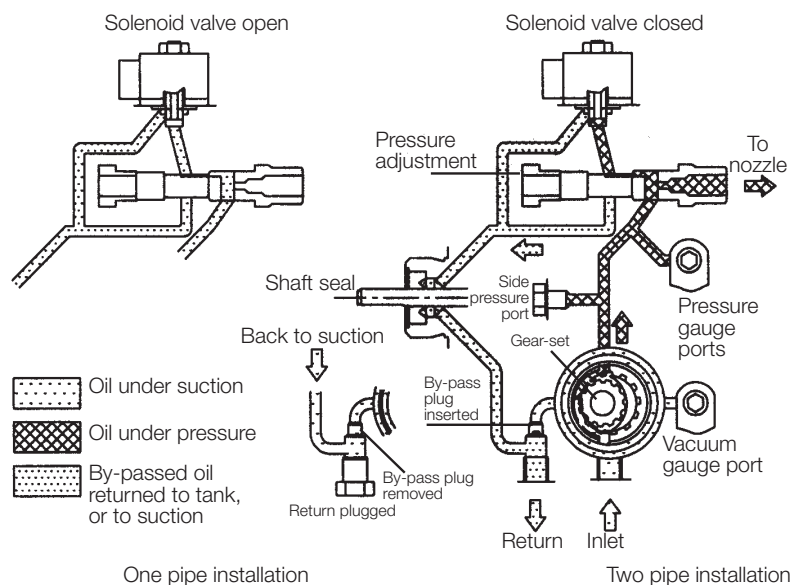
Do not forget to replace the gasket.

Open the oil supply and switch on the power.

5.1.4 One-pipe system

Remove the return plug (8), plug the return line (9) with the metal plug (7) G 1/4".

5.1.5 Function AS47CK



Pump working method

The oil pump has a solenoid valve which regulates the closing of the oil flow and provides a crisp function independent of pump rpm.

The pump's gear wheels draw oil from the tank through the integral filter and conveys the oil to the regulator valve which pressurizes the nozzle connection.

The quantity of oil that does not go to the nozzle connection is led through the valve back to the return line, or in the case of a one-pipe installation, back to the suction connection in the gear wheel pump.

- Two-pipe system

When the solenoid valve is not activated, the return plug channel between the pressure side and the return side of the pressure valve is open. No pressure will be built up to open the pressure valve, regardless of gear wheel pump rpm. When the solenoid valve is activated, the return plug channel is shut. The gear wheel pump's rotation at full rpm quickly builds up the pressure necessary for opening the valve and provides a sharp opening action.

- One-pipe system

Purging of the oil line system is not automatic in the one-pipe system; open the manometer connection for purging.

Shut-down

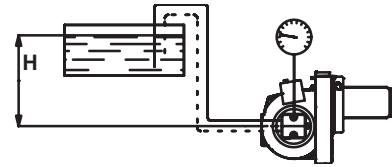
When the burner stops, the solenoid valve opens the return plug channel and drains oil to the return line. At that same moment the nozzle line is closed. This provides a sharp cut-off. The on and off functions can be controlled independent of motor rpm, and react very quickly. When the solenoid valve is not activated torque is low up to full motor rpm.

5.1.6 Suction pipe tables AS47CK

5.1.6.1 Overhead Tank

One-pipe system

Height m	4,0	3,0	2,0	1,0	0,5	0,0
Line diameters						
ø 4 mm	100	100	100	91	82	74



Two-pipe system

Height m	4,0	3,0	2,0	1,0	0,5	0,0
Line diameters						
ø 6 mm	29	25	22	18	16	14

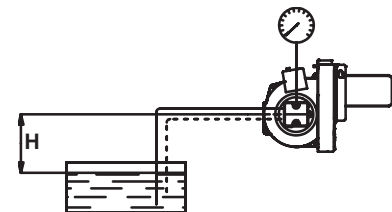
5.1.6.2 Underlying Tank

One-pipe system

For reliable operations, use of a Tigerloop is recommended in underlying tanks.

Two-pipe system

Height m	0,0	-0,5	-1,0	-2,0	-3,0	-4,0
Line diameters						
ø 6 mm	14	12	10	7	3	0



The suction line tables comprise theoretically calculated values where pipe dimensions and oil flow are adapted to prevent turbulent flows from occurring.

Turbulent flows can result in pressure losses and noise in the pipework. A typical pipe system usually comprises pipe runs with 4 bends, a non return valve, a shut-off valve and a pre-filter.

The total resistance of these items is such that it can be disregarded. In the tables no run longer than 100 m is listed, as experience shows this not to be required.

The tables apply to standard heating oil of normal grade merchantable according to existing norms. When starting operations with an empty pipe system, the pump should not be run without oil for more than 5 min.

The tables give the total suction line length in meters with a nozzle capacity of 2.1 kg/h. Max. permissible pressure on the suction and return lines is 2.0 bar. For a two-pipe system the Q_{max} 46 l/h pump capacity at 0 bar applies.

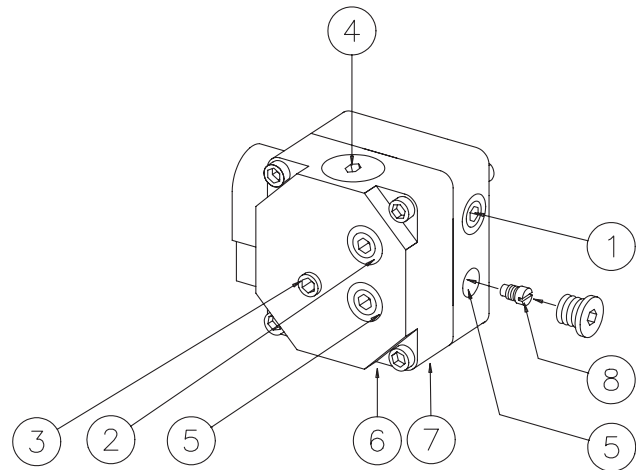
5.2 Danfoss BFP41L3

5.2.1 Technical data

Viscosity range:	1,3–12,0 mm ² /s
Pressure range:	7–15 bar
Oil temperature:	–10 to +70°C

5.2.2 Components

1. Nozzle connection G 1/8"
2. Pressure connection G 1/8"
3. Pressure control 4 mm Allen key
4. Cartridge filter
5. Vacuum gauge connection G 1/8"
6. Return pipe G 1/4"
7. Suction pipe G 1/4"
8. Return plug



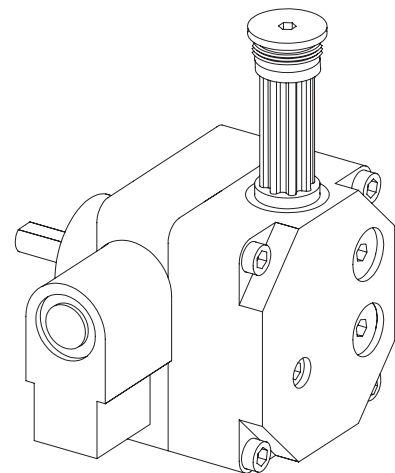
5.2.3 Venting

Venting is only necessary in a one-pipe system. In two-pipe systems the pump is automatically vented by the return pipe.

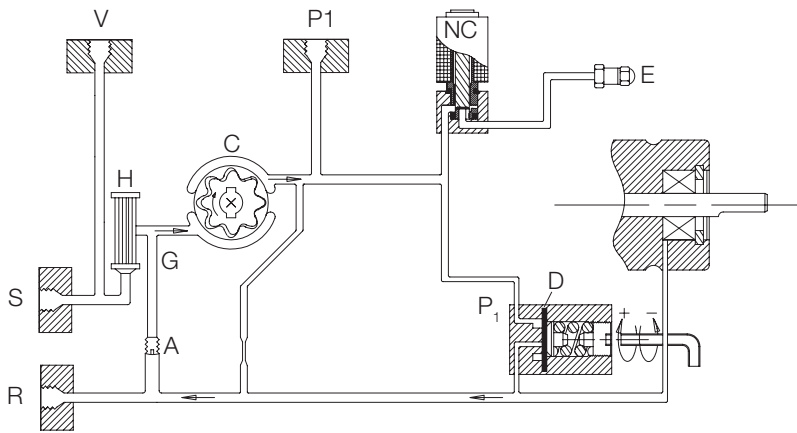
5.2.4 Changing cartridge filter

Unscrew the filter screw from the cover using a 4 mm Allen key and pull out the filter cartridge. Insert a screwdriver between the filter and screw, if necessary, to carefully ease out the filter. Replace the old filter by a new one, pushing it on the filter screw. Reassemble the cartridge and tighten lightly.

Remember to change the O-ring.



5.2.5 BFP41L3 operating principle



When the pump is started, oil is drawn from the suction port (S) through the filter (H) to the suction port (C) of the gear-set.

The oil then moves to the pressure side of the gearwheel and is thus pressurised. The pressure is controlled and maintained at a constant pre-set level by diaphragm (D) of the control valve (P_1)

The control valve (P_1) distributes the oil supplied by gear-set (C) between the nozzle connection (E) and the return port of the pump (R).

The amount of oil consumed is determined by the pressure set on the control valve (P_1) and by the size of the oil nozzle in the nozzle line.

The control valve (P_1) operates as follows:

- When the oil attains opening pressure, the port to the return side opens.
- The diaphragm and the spring keep a constant pump pressure at the set value.
- If the pump becomes overloaded, i.e. if an attempt is made to take out more oil than the gear-set can deliver in the prevailing circumstances, the oil pressure will fall below the set value causing the valve to close, by diaphragm (D), to the return port (R) and return to the starting position.

This can be remedied by:

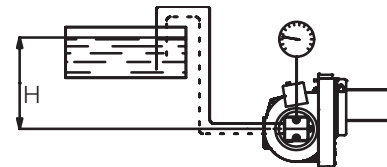
- Lowering the pump pressure.
- Reducing the amount of oil delivered, i.e. changing to a smaller nozzle.
- Changing to a pump with higher capacity.

5.2.6 Suction pipe tables BFP41L3

5.2.6.1 Overhead Tank

One-pipe system

Height m	4,0	3,5	3,0	2,5	2,0	1,5	1,0	0,5
Line diameters								
ø 4 mm	51	45	38	32	26	19	13	6
ø 5 mm	100	100	94	78	62	47	31	16
ø 6 mm	100	100	100	100	100	97	65	32



Two-pipe system

Height m	4,0	3,5	3,0	2,5	2,0	1,5	1,0	0,5
Line diameters								
ø 6 mm	33	31	29	27	25	23	21	19
ø 8 mm	100	98	91	85	79	72	66	60
ø 10 mm	100	100	100	100	100	100	100	100

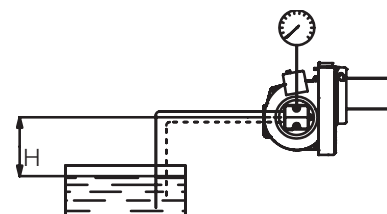
5.2.6.2 Underlying Tank

One-pipe system

For reliable operations, use of a Tigerloop is recommended in underlying tanks.

Two-pipe system

Height m	0	-0,5	-1,0	-1,5	-2,0	-2,5	-3,0	-3,5	-4,0
Line diameters									
ø 6 mm	17	15	13	11	9	7	5	3	1
ø 8 mm	53	47	41	34	28	22	15	9	3
ø 10 mm	100	100	99	84	68	53	37	22	6



The suction line tables comprise theoretically calculated values where pipe dimensions and oil flow are adapted to prevent turbulent flows from occurring. Turbulent flows can result in pressure losses and noise in the pipework. A typical pipe system usually comprises pipe runs with 4 bends, a non-return valve, a shut-off valve and a pre-filter.

The total resistance of these items is such that it can be disregarded. In the tables no run longer than 100 m is listed, as experience shows this not to be required.

The tables apply to standard heating oil of normal grade merchantable according to existing norms. When starting operations with an empty pipe system, the pump should not be run without oil for more than 5 min. (This presupposes that the pump is lubricated with oil when running.)

The tables give the total suction line length in meters with a nozzle capacity of 2.5 kg/h. Max. permissible pressure on the suction and pressure lines is 2.0 bar.

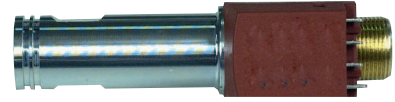
6. PREHEATER

Function FPHB 5

When the boiler thermostat closes it supplies power to the preheater PTC element in order to preheat the oil. When the oil reaches the right temperature the preheater thermostat closes, sending the start signal to the burner.

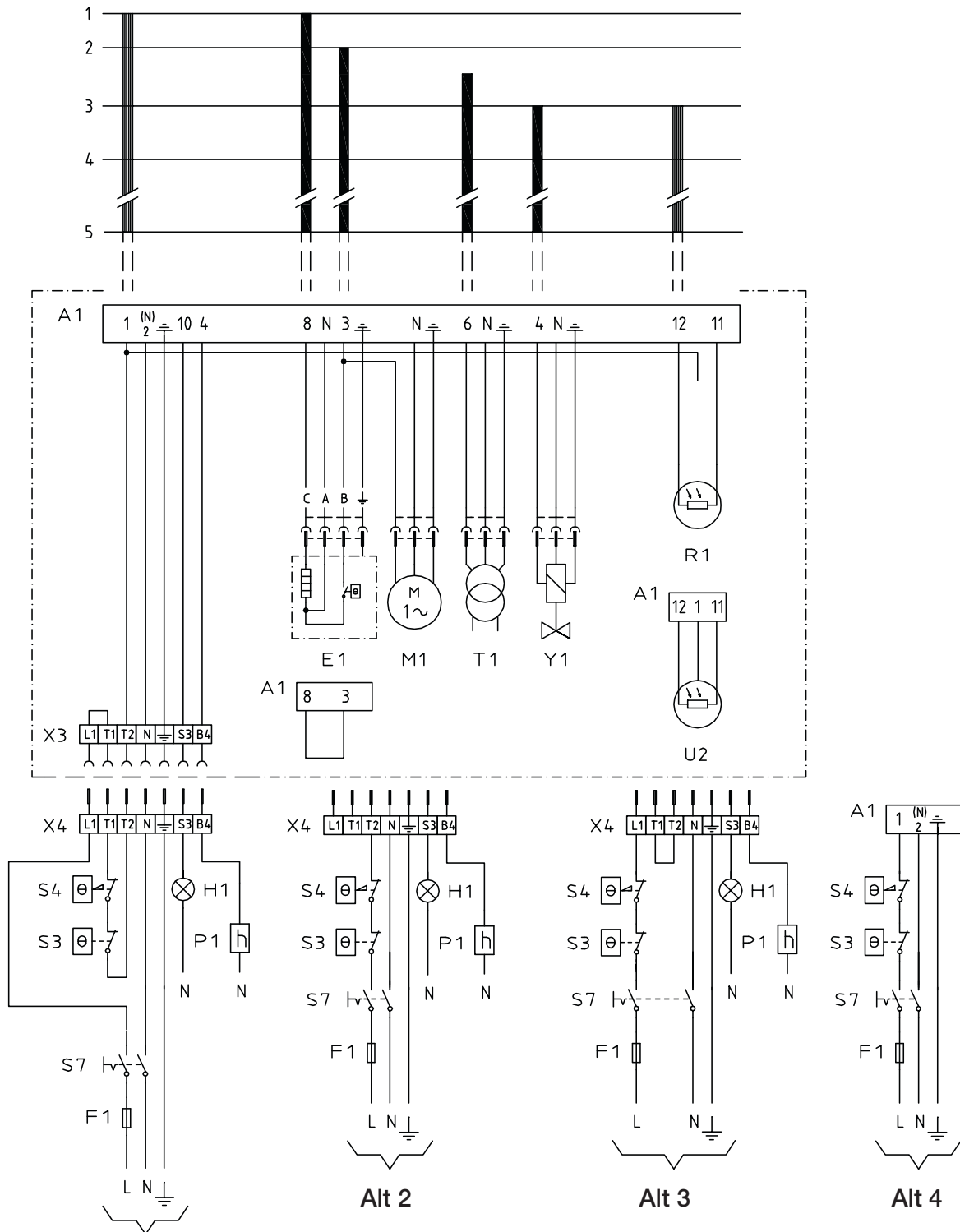
During operation the output of the PTC element is adjusted automatically so that the temperature does not rise too high. If the oil temperature is low and the oil flow is high, the preheater thermostat may cut out.

Because of this it is important that the burner control system has a circuit that maintains preheat.



7. ELECTRIC EQUIPMENT LMO1..2..4..

7.1 Wiring diagram



Alt. 1

According to DIN 4791

7.1.1 List of components

A1	Oil burner control	S3	Operations thermostat
E1	Preheater	S4	Temperature limiter
F1	Fuse, max 10 A	S7	Main switch
H1	Alarm lamp	T1	Ignition transformer
M1	Burner motor	Y1	Solenoid valve
P1	Timer (Accessory)	X1	Plug-in contact, burner
R1	Photocell QRB	X2	Plug-in contact, boiler
U2	UV-Detector QRC		

Preheater wiring colours: A Blue B Brown C Black

The installation must be connected to the mains and fused according to local regulations.

7.1.2 Function LMO1..2..4..

1a.	Operations switch ON, thermostat ON The burner motor starts, ignition sparks initiated and pre-ventilation continues until the set pre-ventilation period is over and the solenoid valve (2) opens.
1b.	Operations switch ON, thermostat ON The preheater is energized and the pre-heating period begins. This continues until the operating temperature is reached and the preheater thermostat closes. The burner motor starts, ignition sparks initiated and pre-ventilation continues until the set pre-ventilation period is over and the solenoid valve (2) opens.
2.	Solenoid valve opens The oil mist is formed and ignited. The photocell indicates flame. The ignition spark ceases 15 sec. after flame indication.
3.	Safety period runs out
a	If the flame is not present before the end of this period, the oil burner control blocks further operation.
b	If the flame for any reason disappears after this time period, the burner will make a new start attempt.
4-5	During operation If burner operations are interrupted via the main switch or thermostat, a new start will be initiated when conditions according to point 1 are fulfilled.
	Oil burner control blocks Red light on the oil burner control illuminates. The burner is re-started by pressing the reset button.

7.1.3 Technical data

	LM014	LM024	LM044
Pre-ignition period:	15 s	25 s	25 s
Pre-ventilation period:	16 s	26 s	26 s
Post-ignition period:	10 s	5 s	5 s
Safety period:	< 10 s	< 5 s	< 5 s
Re-connection after release:	< 1 s	< 1 s	< 1 s
Reaction time flame extinction:	< 1 s	< 1 s	< 1 s
Ambient temperature:	-5 - +60°C	-5 - +60°C	-20 - +60°C
Min. current with flame:	45 µA	45 µA	45 µA
Max current when dark, start:	5,5 µA	5,5 µA	5,5 µA
Ingress Protection:	IP 40	IP 40	IP 40

Photocell current checks

Photocell current is measured with a direct current ammeter (multimeter µA) connected in series with the photocell.

7.1.4 Colour codes LMO14/24

When the burner starts, three signal lights in the reset switch indicate the normal sequence, as well as provide indication if something abnormal is happening in accordance with the following table:

Preheater in operation	Solid yellow
Ignition switched on	Flashing yellow
Normal operation	Solid green
Operation, poor flame signal	Flashing green
Undervoltage	Flashing yellow-red
Fault, alarm	Solid red
False light	Flashing red-green
Communication mode	Fluttering red

7.1.5 Fault codes LMO14/24

When the red light for a blocked relay box comes on, you can get information about what has caused the problem by pressing and holding the reset button for 3 seconds.

The number of flashes below is repeated with a pause in between.

2 flashes	No flame signal when safety time expires
4 flashes	False light during start
7 flashes	3 x Losses of flame during operation
8 flashes	Time-out for preheater *
10 flashes	Incorrect wiring, internal fault or simultaneous occurrence of two faults

* In order for this fault code to occur, the preheater shall not reach its cut-off temperature within 10 mins. from switch on.

To return to normal operation: Press the reset button for 1 second.

If the reset button is instead kept pressed a second time for at least 3 seconds, you can, via an interface, obtain the corresponding information on a computer or flue gas analyser.

To return to normal operation: Press the reset button for 1 second

8. FAULT LOCATION

8.1 Burner will not start

Symptom	Causes	Remedies
Motor starts	Unstable flame	Adjust the damper
Burner pre-ventilates	Excess air	
	Low oil pressure	
Flame formed	Incorrect combustion apparatus settings	Check the nozzle in relation to the combustion apparatus dimensions and the ignition electrode position
Burner trips		Check the flame monitor is clean and can register light
Motor starts	Flame monitor does not register light	Check with using new photocell
Burner pre-ventilates	Defective flame monitor	Check using new oil burner control (Note: replacement of photocell recommended if oil burner control replaced)
No flame formed	Defective oil burner control	
Burner trips	No oil	Check the oil supply to the burner and that there are no air bubbles in the pump
	False light	Check function of solenoid
	No spark	Check flame monitor does not register ambient light
		Check high voltage wiring and ignition electrodes

8.2 Burner will not start after normal use

Burner does not start	Fuse blown	Check and replace fuse as necessary. Investigate cause of fault
	Boiler thermostat has not reset	
Burner pre-ventilates	Overheating protection has deployed	Reset the overheating protection. Investigate the cause of its deploying. Remedy fault
	Defective preheater	Check by replacing with new
	Defective oil burner control or flame monitor	
Burner stops	No oil supply	Check that tank, oil lines, solenoid valves, pump and nozzle are in good condition
	Too great a pressure drop at brake plate	Adjust the burner
	Too strong draught prevents flame forming	Correct the boiler draught
	No spark	Check the ignition transformer. Check the ignition electrode settings and ceramics

8.3 Delayed ignition, burner starts; pulsation

Burner pulsates at start with hot flue gases	Too strong a draught	Correct the boiler draught
	Too great a pressure drop at brake plate	Adjust the burner
Burner pulsates at start	Nozzle partially blocked	Replace nozzle
	Oil pressure too low	Check and adjust
	Flue blocked or damaged	Check and correct
	Fan wheel slipping on shaft	Check and tighten
	Pump coupling loose or worn	Replace
	Preheater clogged	Check ignition electrode adjustment (refer to technical data)
Delayed ignition	Check ignition electrodes not damaged	
Too strong a draught	Check high voltage wiring	
Too great a pressure drop at brake plate	Check position of nozzle assembly adjustment	
	Correct the boiler draught	
	Adjust the burner	

10. OIL BURNERS MAINTENANCE INSTRUCTIONS

General information

Keep the boiler room clean. Ensure that the boiler room has permanent fresh air intake. Switch off before dismantling the oil burner.

At hinged mounting, make sure that an automatic safety switch is fitted, so that the burner cannot start when the swinging door is open.

Don't use the oil fired boiler to burn paper or rubbish, unless the boiler is especially fitted with a hinged door to make this possible.

Don't fill tank while burner is working.

Starting precautions

Make sure that the oil tank is not empty

Make sure that the valves on oil and water supply pipes are open.

Make sure that the boiler flue damper is open.

Make sure that the boiler thermostat is set at the correct temperature.

Switch on the current. Most relay systems have a delayed action so that the burner will not start for perhaps 20 seconds.

With heavy oil the delay will be longer as the burner will not start until the oil in the preheater reaches the required temperature.

If the burner will not start

Press the reset button on the relay. Check that the thermostats are correctly adjusted.

Don't forget the room thermostat, check that any fuses are intact and main switch is on.

Installed by:

.....

Tel:

If the burner starts but does not ignite

Make an attempt to start the burner.

Never make close repeated start attempts.

Don't restart the burner until the boiler is free from oil gases.

If the burner still does not ignite send for the service engineer.

When switching off during summer

Always use the main switch to cut out the burner even when adjusting the burner or cutting off the heating for a short time. For longer periods of shut down, close all valves and the oil supply stop-cock.

Clean the filter and nozzle by washing in petrol or paraffin.

Make sure the filter medium is not damaged or defective.

Protect electrical gear from damp.

Warning

Never stand too near or put your face to the inspection or fire door, when the burner is about to start.

Never use a naked flame to ignite oil if the electrical ignition fails.

Always wait for about 10 minutes for the unburnt gases to disperse before restarting the oil burner if it has failed to ignite previously.

