178 091 51-2 2017-11–28

Installation- and maintenance instruction

B30A RME, B40A RME

Bentone®

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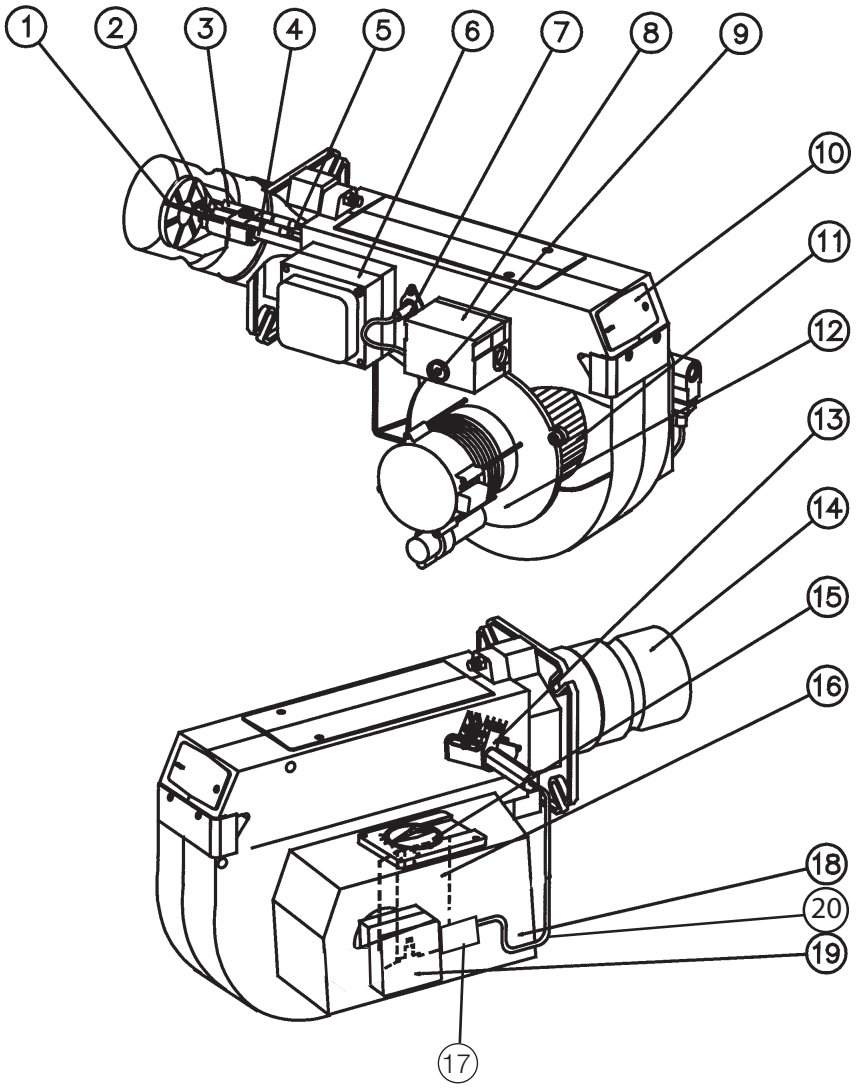
1. DESCRIPTION

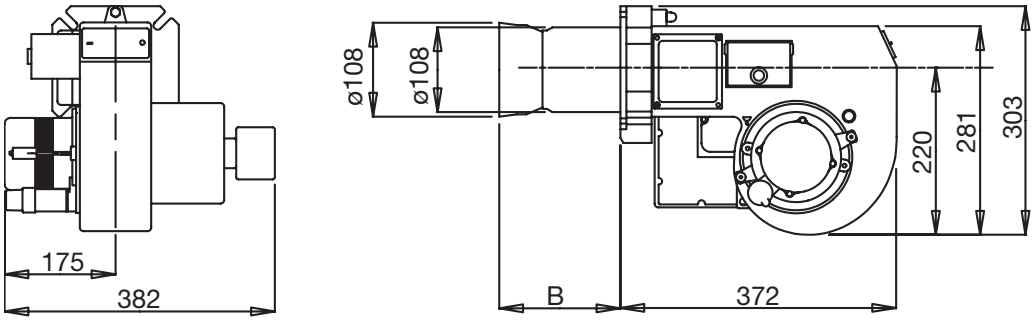


Components

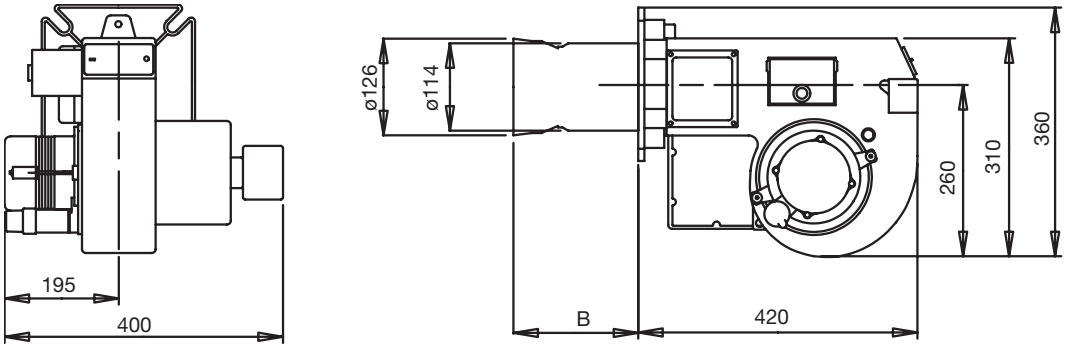
1. Shrouded disc
2. Nozzle
3. Ignition electrodes
4. Nozzle assembly
5. Ignition cable
6. Ignition transformer
7. Photo cell
8. Control box
9. Reset button
10. Cover, inspection glass
11. Fan wheel
12. Motor
13. Nozzle assembly adjustment
14. Blast tube
15. Air adjustment
16. Air damper
17. Solenoid valve on connection hose
18. Air intake
19. Pump
20. Connection hose

2. TECHNICAL DATA

2.1 Dimensions B30A

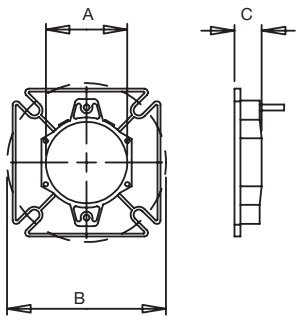


2.2 Dimensions B40A



Burner tube B30		Length of burner tube	Measure B
L		150	115
L	Standard	222	187
L		350	315
Burner tube B40			
N	Standard	202	172
N		302	272

Flange measure	A	B	C
B30	ø 108	160-190	35
B40	ø 114	200-230	37



TECHNICAL DATA

2.3 Output range and nozzles recommended

Burner	Oil capacity	Output		Recommended Nozzle		Recommended Pump pressure
	kg/h	kW	Mcal/h	Angle	Type	Bar
B30	6,0-17,0	71-202	61-173	45°, 60°	Solid, Semisolid	10-15
B40	9,0-29,5	107-350	92-301	45°, 60°	Solid, Semisolid	10-15

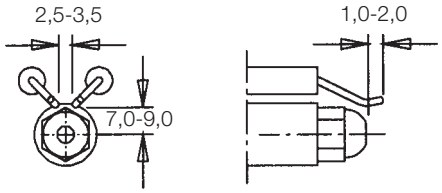
The net calorific value of 11,86 kWh/kg for light oil has been used.

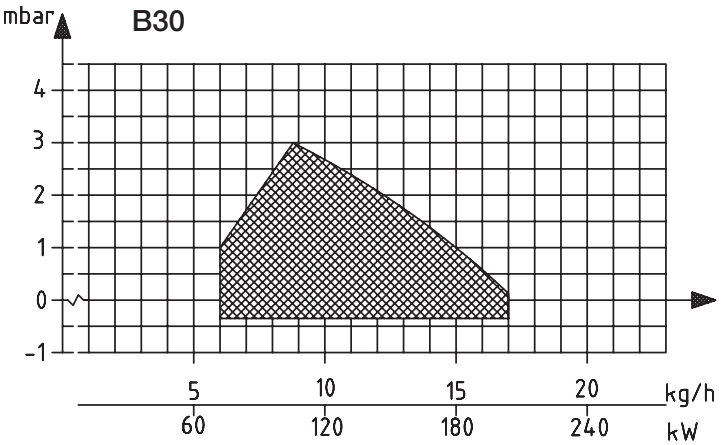
2.4 Recommended nozzle

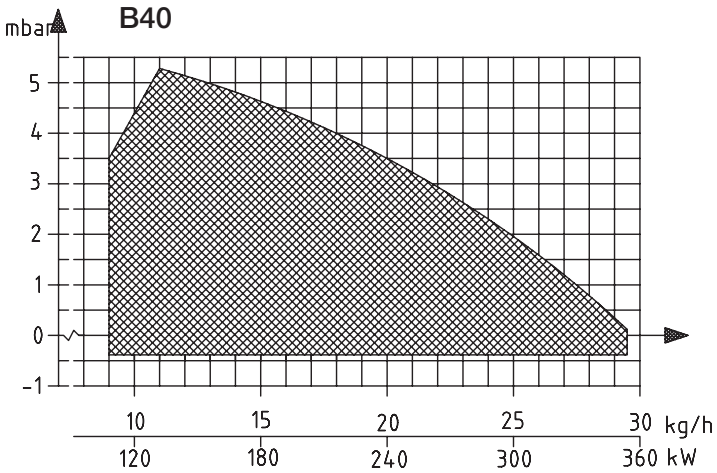
Because of different boiler types existing on the market, with varying combustion chamber designs, it is not possible to state a definite spray angle or spray pattern.

Note that the spray angle and the spray pattern change with the pump pressure.

2.5 Electrode adjustment







3. GENERAL INSTRUCTIONS

General rules

This is a burner designed for FAME (RME) fuel. The fuel must meet the requirements of standard EN 14214 for FAME. The equipment on the burner is, however, of such a quality that it is possible to use EO1 type oil without modification, although with appropriate adjustments to the combustion values after each change of fuel type.

The installation of an oil burner should be carried out in accordance with local regulations. The installer of the burner must therefore be aware of all regulations relating to oil and combustion.

Only oil suitable for the burner must be used and then in combination with a suitable oil filter designed for FAME (RME) and installed before the burner's oil pump.

If the burner is replacing an existing burner, ensure that the oil filter is changed to a filter designed for FAME (RME). Installation may only be performed by qualified personnel.

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

Burners which are fuelled by FAME (RME) are and must be equipped with parts designed for this fuel. This applies in particular to oil-related parts such as the pump, solenoid valve, oil filter and hoses. It is very important when carrying out a service to replace old parts with new parts of the same quality.

Installation instructions

General installation instructions accompany the burner and should be left in a prominent place adjacent to the burner.

Adjustment of burner

The burner is from the factory preset to an average value that must then be adjusted to the boiler in question.

All burner adjustments must be made in accordance with boiler manufacturers instructions.These must include the checking of flue gas temperatures, average water temperature and CO2 or O2 concentration.

To adjust the combustion device, start by increasing the air volume and the nozzle assembly somewhat. When the burner starts it is burning with excess air and smoke number 0. Reduce the nozzle assembly adjustment until soot occurs, and then increase the adjustment to make the soot disappear again. Then the volume of air is reduced until soot occurs and increased again to reach a combustion free of soot.

By this procedure an optimum adjustment is obtained. If larger nozzles are used the preadjustment of both the air volume and the nozzle assembly must be increased.

A whistling sound may be heard which can be eliminated or reduced as follows: Increase the nozzle assembly adjustment somewhat. The CO2-content will then be reduced and the air volume has then consequently to be reduced.

Condensation in chimney

A modern burner works with less excess air and often also with smaller nozzles than older models. This increases the efficiency but also the risk of condensation in the chimney. The risk increases if the area of the chimney flue is too large. The temperature of the flue gases should exceed 60°C measured 0,5 metres from the chimney top.

- Measures to raise the temperature:
- Insulate the chimney in cold attics
- Install a tube in the chimney
- Install a draught regulator (dilutes the flue gases during operation and dries them up during standstill)
- Increase the oil quantity
- Raise the flue gas temperature by removing turbulators, if any, in the boiler.

Pump adjustment

See separate description.

Maintenance

The boiler/burner should be examined regularly for any signs of malfunction or oil leakage. Any boiler/burner that uses FAME (RME) as fuel must be serviced at least twice a year.

Oil supply

The oil line should be dimensioned in accordance with the pump manufacturer´s instruction. A filter designed for FAME (RME) that prevents any particles in the oil from reaching the burner is mounted in the burner's suction pipe. If the installation consists of several burners each one should have its own suction line from the tank or a circulation system should be used.

The temperature in the oil line should be kept as constant as possible. Avoid exposing the line to excessive cold which may cause blockages.

The oil pipe and electric cable should be fitted so that the burner can be placed on the floor for inspection of the combustion device.

Oil hoses must be of a quality designed for FAME (RME).

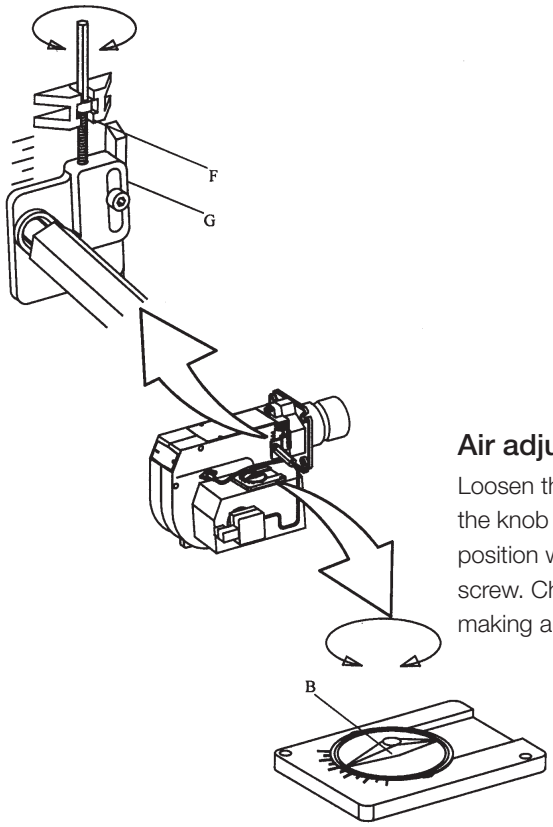
Adjustment of nozzle assembly B30

Loosen the screw G and adjust the nozzle assembly by turning the screw F.

Max. capacity - Front position

Medium capacity - Middle position

Min. capacity - Rear position

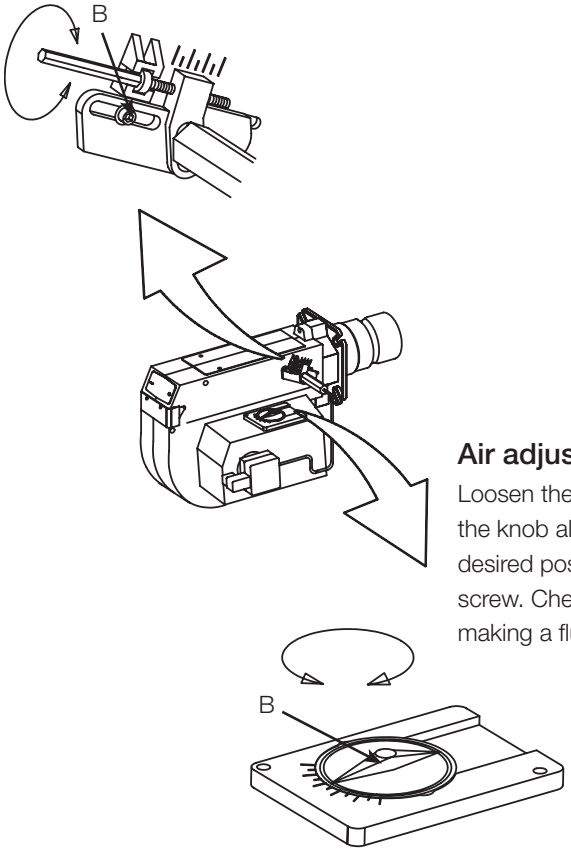


Air adjustment 0-10

Loosen the stop screw B and turn the knob along the scale to the position wanted and tighten the screw. Check the air adjustment by making a flue gas analysis.

Adjustment of nozzle assembly B40

Loosen the locking screw B and adjust the nozzle assembly to the desired position. Lock the screw B again.



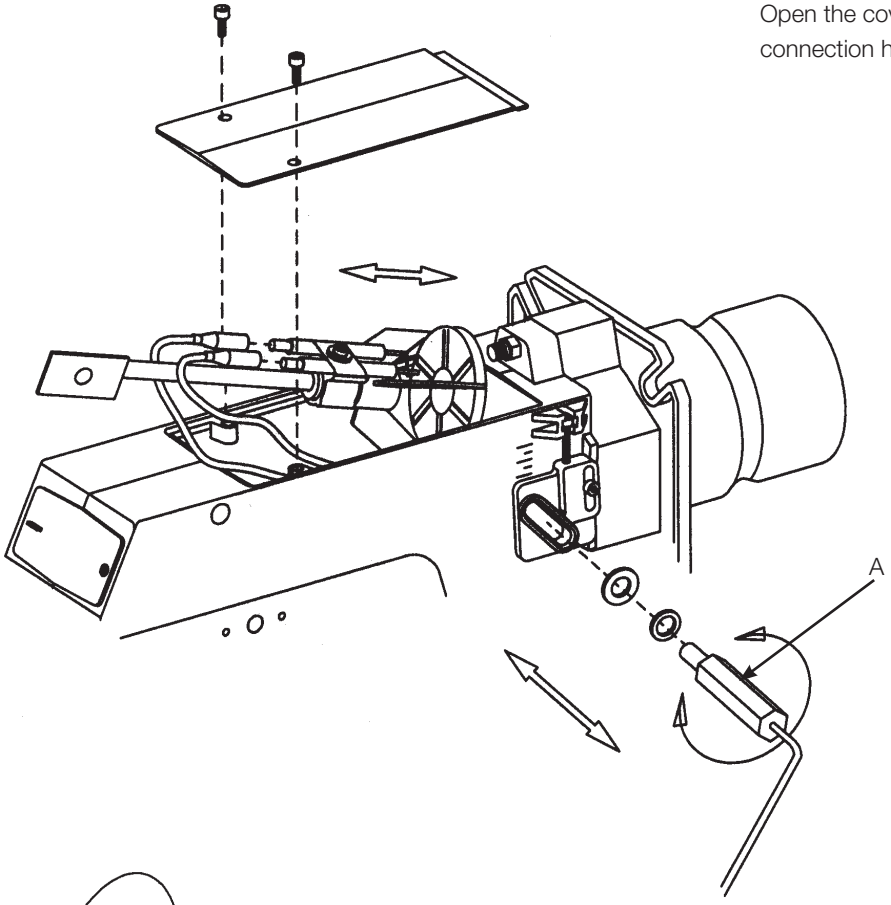
Air adjustment 0-10

Loosen the stop screw B and turn the knob along the scale to the desired position and tighten the screw. Check the air adjustment by making a flue gas analysis.

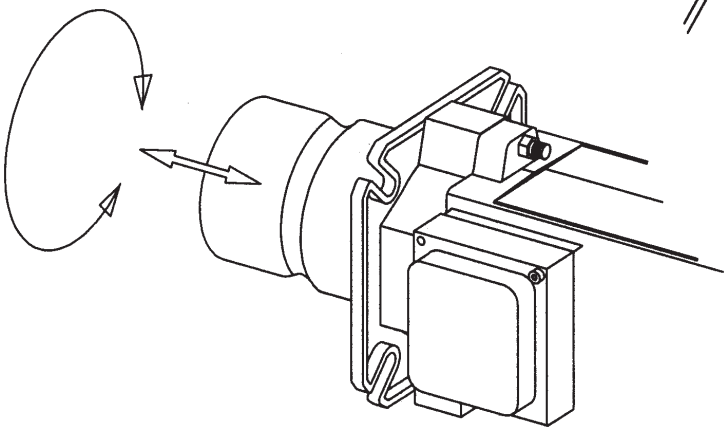
4. MAINTENANCE OF OIL BURNER B30

> **!** Warning: Before doing any service switch off power at the main switch and cut off the oil supply

Service of burner head



Open the cover plate and remove the connection hose by undoing screw A.



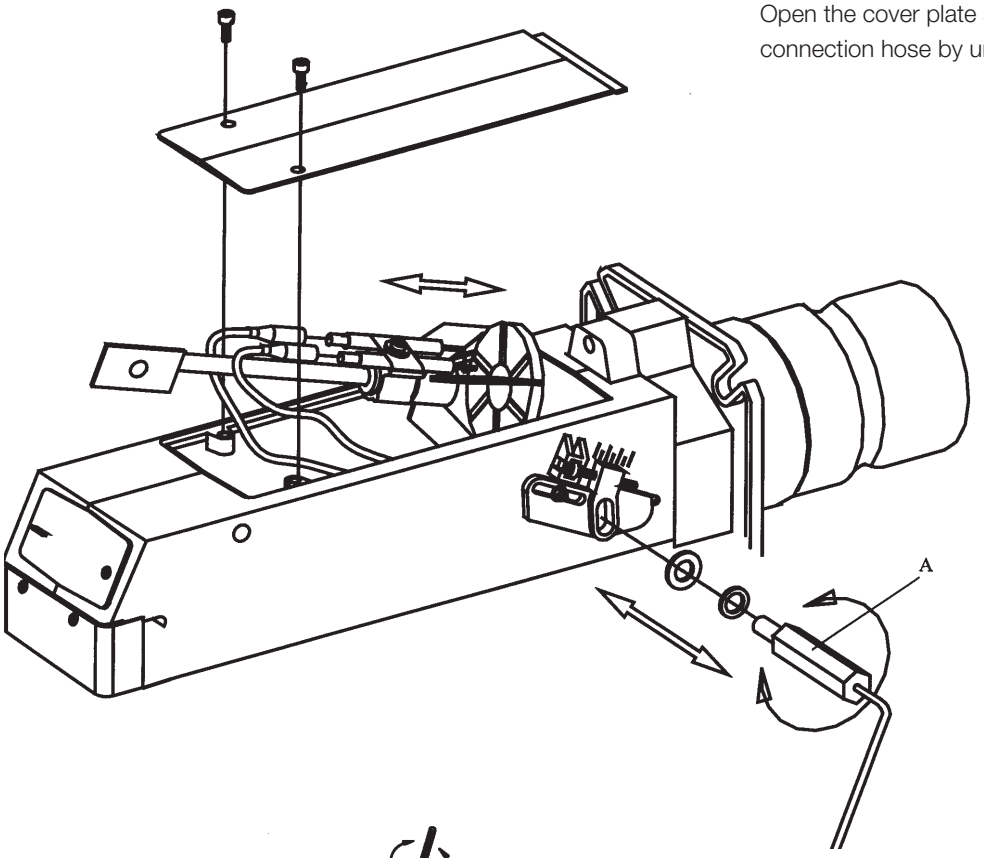
1. Loosen or swing out the burner from the boiler.
2. Turn the blast tube to the left and withdraw it.

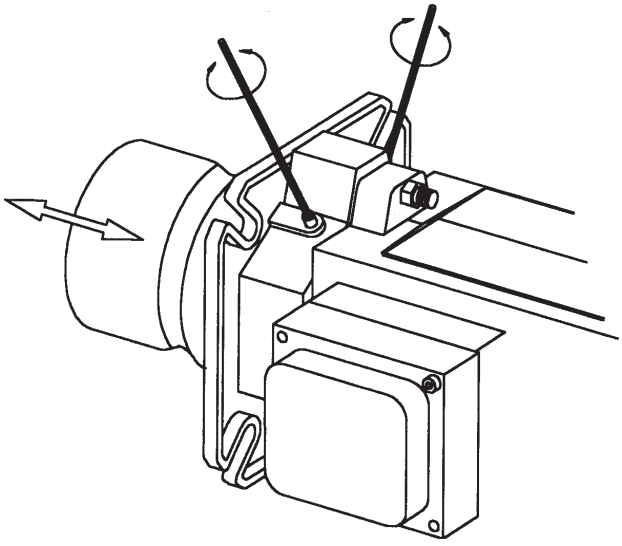
5. MAINTENANCE OF OIL BURNER B40

Warning: Before doing any service switch off power at the main switch and cut off the oil supply

Service of burner head

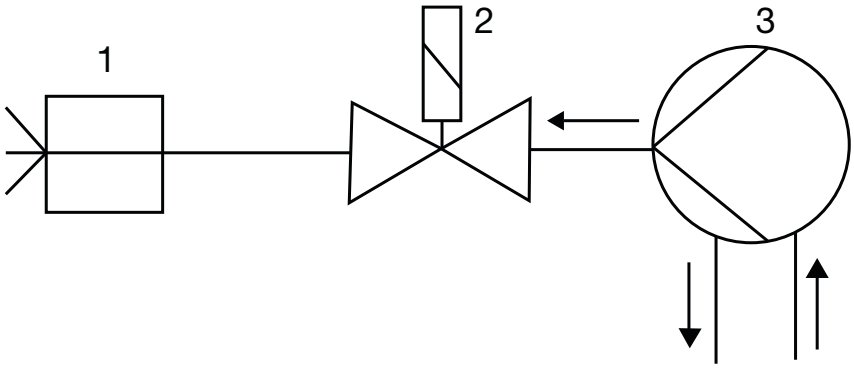
Open the cover plate and remove the connection hose by undoing screw A.





1. Loosen or swing out the burner from the boiler.
2. Loosen 2 fixing screws and withdraw the blast tube.

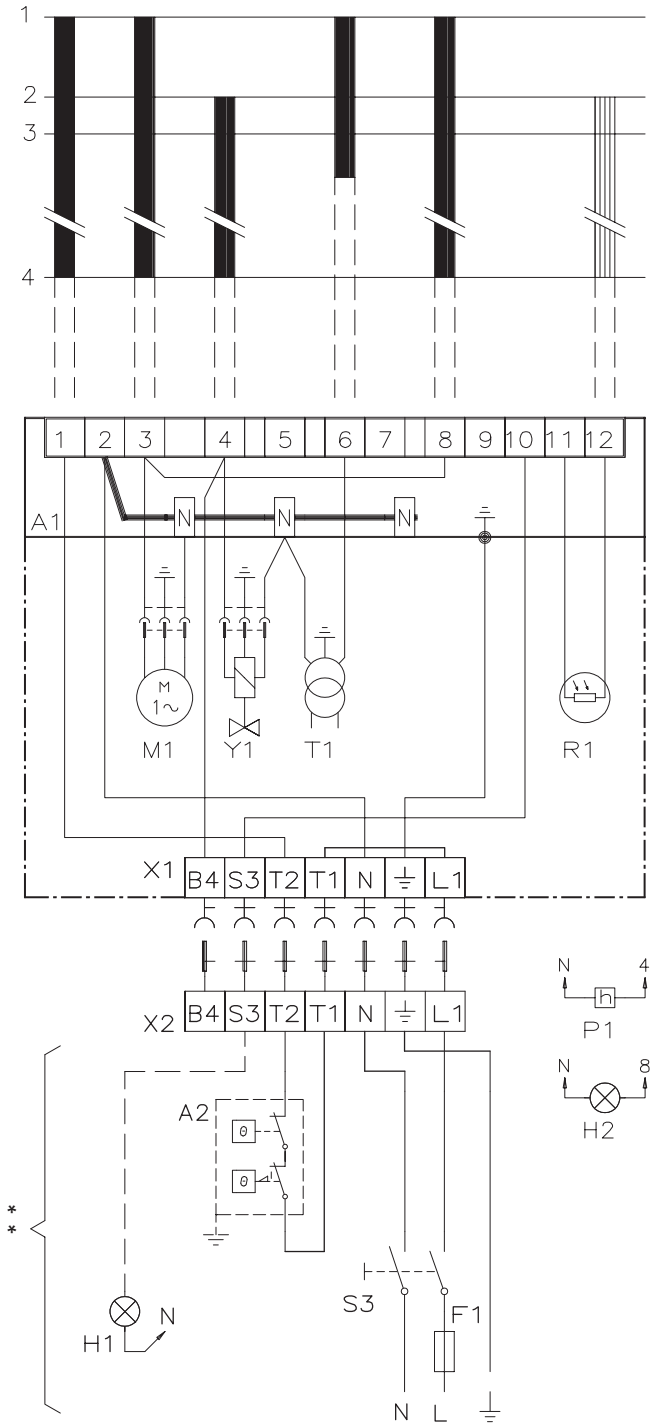
6. OIL CIRCUIT DIAGRAM



1. Nozzle
2. Safety valve
3. Oil pump

7. ELECTRIC EQUIPMENT

7.1 OIL BURNER CONTROL: LMO14... / LMO24...

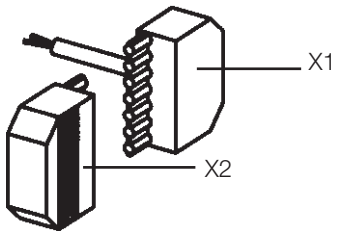


List of components

A1 Oil burner control
A2 Twin thermostat
F1 Fuse, max. 10A
H1 Alarm lamp
H2 Signal lamp (optional)
M1 Burner motor
P1 Time meter (optional)
R1 Photoresistor
S3 Main switch
T1 Ignition transformer
Y1 Solenoid valve
X1 Plug-in contact, burner
X2 Plug-in contact, boiler

Mains connection and fuses in accordance with local regulations.

Outer electrical connection



* If there is no plug-in contact (X2) on the boiler, connect to the contact enclosed. In case the twin thermostat is in series on incoming phase L1, a loop between the terminals T1 and T2 is necessary.

ELECTRIC EQUIPMENT

	LMO14.113...	LMO24.255...
Pre-ignition time:	15 s	25 s
Pre-purge time:	16 s	26 s
Post-ignition time:	3 s	5 s
Safety lock-out time:	< 10 s	< 5 s
Reset time after lockout:	< 1 s	< 1 s
Reaction time on flame failure:	< 1 s	< 1 s
Ambient temperature:	-5 +60°C	-20 - +60°C
Min. current with flame established:	45 µA	45 µA
Max. photo current at start:	5,5 µA	5,5 µA
Enclosure:	IP 40	IP 40

Function

1 **Switch on operating switch and twin thermostat**

The burner motor starts, an ignition spark is formed, the prepurge goes on till the prepurge period expires and the solenoid valve opens (2).

2 **Solenoid valve opens**

Oil mist is formed and ignited. The photocell indicates a flame. The ignition spark goes out after flame indication (See Technical data oil burner control).

3 **The safety time expires**

a. If no flame is established before this time limit the control cuts out.

b. If for some reasons the flame disappears after this time limit, the burner will make an attempt to re-start.

3-4 **Operating position**

If the burner operation is interrupted by means of the main switch or the thermostat, a new start takes place when the conditions in accordance with point 1 are fulfilled.

The oil burner control cuts out

A red lamp in the control is lit. Press the reset button and the burner re-starts.

Control of photo current

Current through photo unit is measured with a d.c. ammeter (a moving coil instrument connected in series with the photo unit).

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

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. NOZZLE TABLE

Pump pressure bar

Gph	8			9			10			11		
	kg/h	kW	Mcal/h	kg/h	kW	Mcal/h	kg/h	kW	Mcal/h	kg/h	kW	Mcal/h
0,40	1,33	16	13	1,41	17	14	1,49	18	15	1,56	18	16
0,50	1,66	20	17	1,76	21	18	1,86	22	19	1,95	23	20
0,60	2,00	24	20	2,12	25	22	2,23	26	23	2,34	28	24
0,65	2,16	26	22	2,29	27	23	2,42	29	25	2,54	30	26
0,75	2,49	29	25	2,65	31	27	2,79	33	28	2,93	35	30
0,85	2,83	33	29	3,00	36	31	3,16	37	32	3,32	39	34
1,00	3,33	39	34	3,53	42	36	3,72	44	38	3,90	46	40
1,10	3,66	43	37	3,88	46	39	4,09	48	42	4,29	51	44
1,20	3,99	47	41	4,24	50	43	4,47	53	46	4,68	55	48
1,25	4,16	49	42	4,40	52	45	4,65	55	47	4,88	58	50
1,35	4,49	53	46	4,76	56	48	5,02	59	51	5,27	62	54
1,50	4,98	59	51	5,29	63	54	5,58	66	57	5,85	69	60
1,65	5,49	65	56	5,82	69	59	6,14	73	63	6,44	76	66
1,75	5,82	69	59	6,18	73	63	6,51	77	66	6,83	81	70
2,00	6,65	79	68	7,06	84	72	7,45	88	76	7,81	93	80
2,25	7,49	89	76	7,94	94	81	8,38	99	85	8,78	104	89
2,50	8,32	99	85	8,82	105	90	9,31	110	95	9,76	116	99
2,75	9,15	108	93	9,71	115	99	10,24	121	104	10,73	127	109
3,00	9,98	118	102	10,59	126	108	11,16	132	114	11,71	139	119
3,50	11,65	138	119	12,35	146	126	13,03	154	133	13,66	162	139
4,00	13,31	158	136	14,12	167	144	14,89	176	152	15,62	185	159
4,50	14,97	177	153	15,88	188	162	16,75	198	171	17,57	208	179
5,00	16,64	197	170	17,65	209	180	18,62	221	190	19,52	231	199
5,50	18,30	217	187	19,42	230	198	20,48	243	209	21,47	255	219
6,00	19,97	237	204	21,18	251	216	22,34	265	228	23,42	278	239
6,50	21,63	256	220	22,94	272	234	24,20	287	247	25,37	301	259
7,00	23,29	276	237	24,71	293	252	26,06	309	266	27,33	324	279
7,50	24,96	296	254	26,47	314	270	27,92	331	285	29,28	347	298
8,00	26,62	316	271	28,24	335	288	29,79	353	304	31,23	370	318
8,50	28,28	335	288	30,00	356	306	31,65	375	323	33,18	393	338
9,00	29,95	355	305	31,77	377	324	33,59	398	342	35,14	417	358

The table applies to oil EO1 with a viscosity of 4,4 mm2/s (cSt) with density 830 kg/m3.

Burner with preheater

Consider that on preheating the oil quantity is reduced by 5-20% depending on

- Rise in temperature at the nozzle
- Design of nozzle
- Capacity (high capacity - small difference)
- Expect the output from the burner to reduce by 10–20% when fuelled by FAME (RME) due to the lower energy content of the oil.

NOZZLE TABLE

Pump pressure bar

Gph	12			13			14			15		
	kg/h	kW	Mcal/h	kg/h	kW	Mcal/h	kg/h	kW	Mcal/h	kg/h	kW	Mcal/h
0,40	1,63	19	17	1,70	20	17	1,76	21	18	1,82	21	18
0,50	2,04	24	21	2,12	25	22	2,20	26	22	2,28	27	23
0,60	2,45	29	25	2,55	30	26	2,64	31	27	2,73	32	28
0,65	2,65	31	27	2,75	33	28	2,86	34	29	2,96	35	30
0,75	3,08	36	31	3,18	38	32	3,30	39	34	3,42	40	35
0,85	3,47	41	35	3,61	43	37	3,74	44	38	3,87	46	39
1,00	4,08	48	42	4,24	50	43	4,40	52	45	4,56	54	46
1,10	4,48	53	46	4,67	55	48	4,84	57	49	5,01	59	51
1,20	4,89	58	50	5,09	60	52	5,29	63	54	5,47	65	56
1,25	5,10	60	52	5,30	63	54	5,51	65	56	5,70	68	58
1,35	5,50	65	56	5,73	68	58	5,95	70	61	6,15	73	63
1,50	6,11	72	62	6,36	75	65	6,60	78	67	6,83	81	70
1,65	6,73	80	69	7,00	83	71	7,27	86	74	7,52	89	77
1,75	7,14	85	73	7,42	88	76	7,71	91	79	7,97	94	81
2,00	8,18	97	83	8,49	101	86	8,81	104	90	9,12	108	93
2,25	9,18	109	94	9,55	113	97	9,91	117	101	10,26	122	105
2,50	10,19	121	104	10,61	126	108	11,01	130	112	11,39	135	116
2,75	11,21	133	114	11,67	138	119	12,11	144	123	12,53	148	128
3,00	12,23	145	125	12,73	151	130	13,21	157	135	13,67	162	139
3,50	14,27	169	145	14,85	176	151	15,42	183	157	15,95	189	163
4,00	16,31	193	166	16,97	201	173	17,62	209	180	18,23	216	186
4,50	18,35	217	187	19,10	226	195	19,82	235	202	20,51	243	209
5,00	20,39	242	208	21,22	251	216	22,03	261	225	22,79	270	232
5,50	22,43	266	229	23,34	277	238	24,23	287	247	25,07	297	256
6,00	24,47	290	249	25,46	302	260	26,43	313	269	27,49	326	280
6,50	26,51	314	270	27,58	327	281	28,63	339	292	29,63	351	302
7,00	28,55	338	291	29,70	352	303	30,84	366	314	31,91	378	325
7,50	30,59	363	312	31,83	377	324	33,04	392	337	34,19	405	349
8,00	32,63	387	333	33,95	403	346	35,25	418	359	36,47	432	372
8,50	34,66	411	353	36,07	428	368	37,45	444	382	38,74	459	395
9,00	36,71	435	374	38,19	453	389	39,65	470	404	41,02	486	418

The table applies to oil EO1 with a viscosity of 4,4 mm2/s (cSt) with density 830 kg/m3.

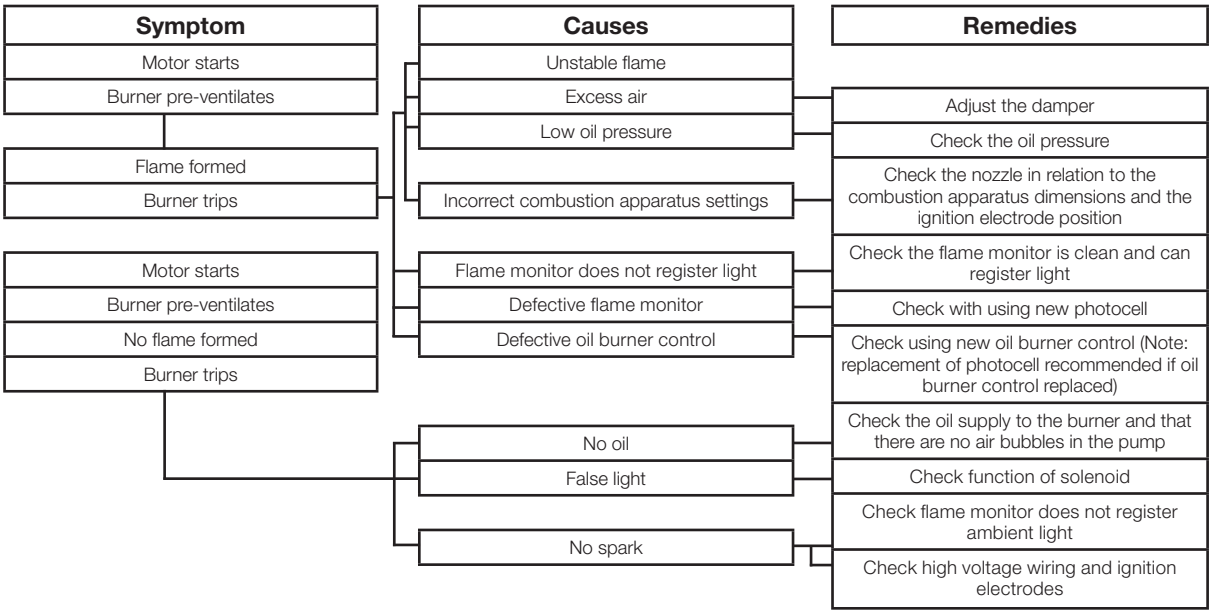
Burner with preheater

Consider that on preheating the oil quantity is reduced by 5-20% depending on

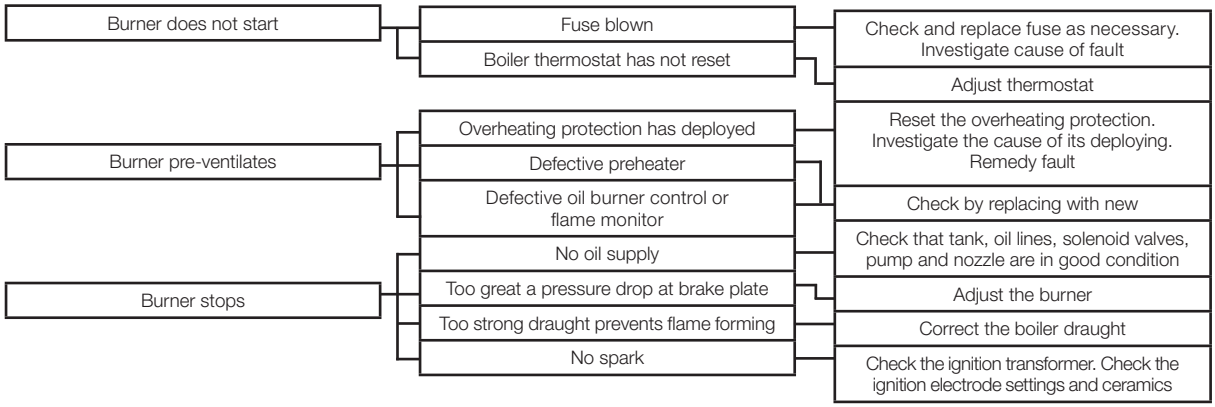
- Rise in temperature at the nozzle
- Design of nozzle
- Capacity (high capacity - small difference)
- Expect the output from the burner to reduce by 10–20% when fuelled by FAME (RME) due to the lower energy content of the oil.

9. FAULT LOCATION

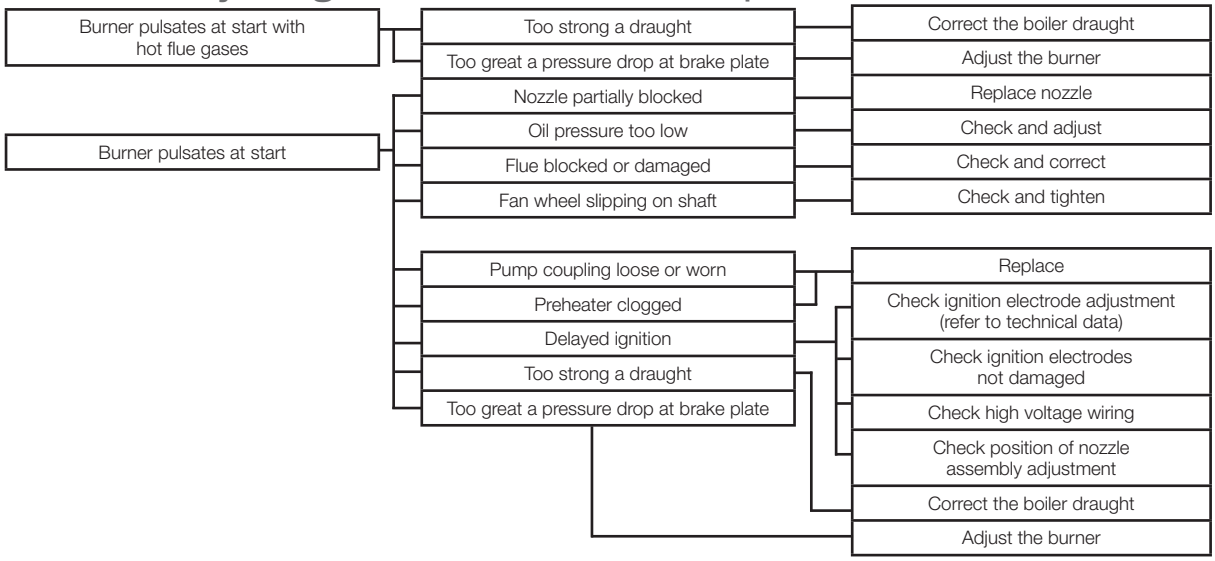
9.1 Burner will not start



9.2 Burner will not start after normal use



9.3 Delayed ignition, burner starts; pulsation



EU Declaration of conformity

CE

Bentone Oilburners

Type

BF 1	ST 133	B 10	B 55
ST 97	ST 146	B 30	B 65
ST 108	B 1	B 40	B 70
ST 120	B 2	B 45	B 80

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

Machinery Directive 2006/42/EC

EMC 2014/30/EU

Restriction of the use of certain hazardous substances (RoHS) Directive 2011/65/EU

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

EN 267:2009+A 1 :2011	(excluded Annex J/K) Automatic forced draught burners for liquid fuels

Additional information can be downloaded at:

www.bentone.com

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Ljungby September 26rd, 2017

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Bentone®

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 theswing 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 tomake 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 areopen.
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 notstart until the oil in the preheater reaches the requiredtemperature.

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 fusesare intact and main switch is on.

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 ashort 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.

Installed by:

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Tel:……..

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