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Installation- and maintenance instruction  
**B55,B65 RME**

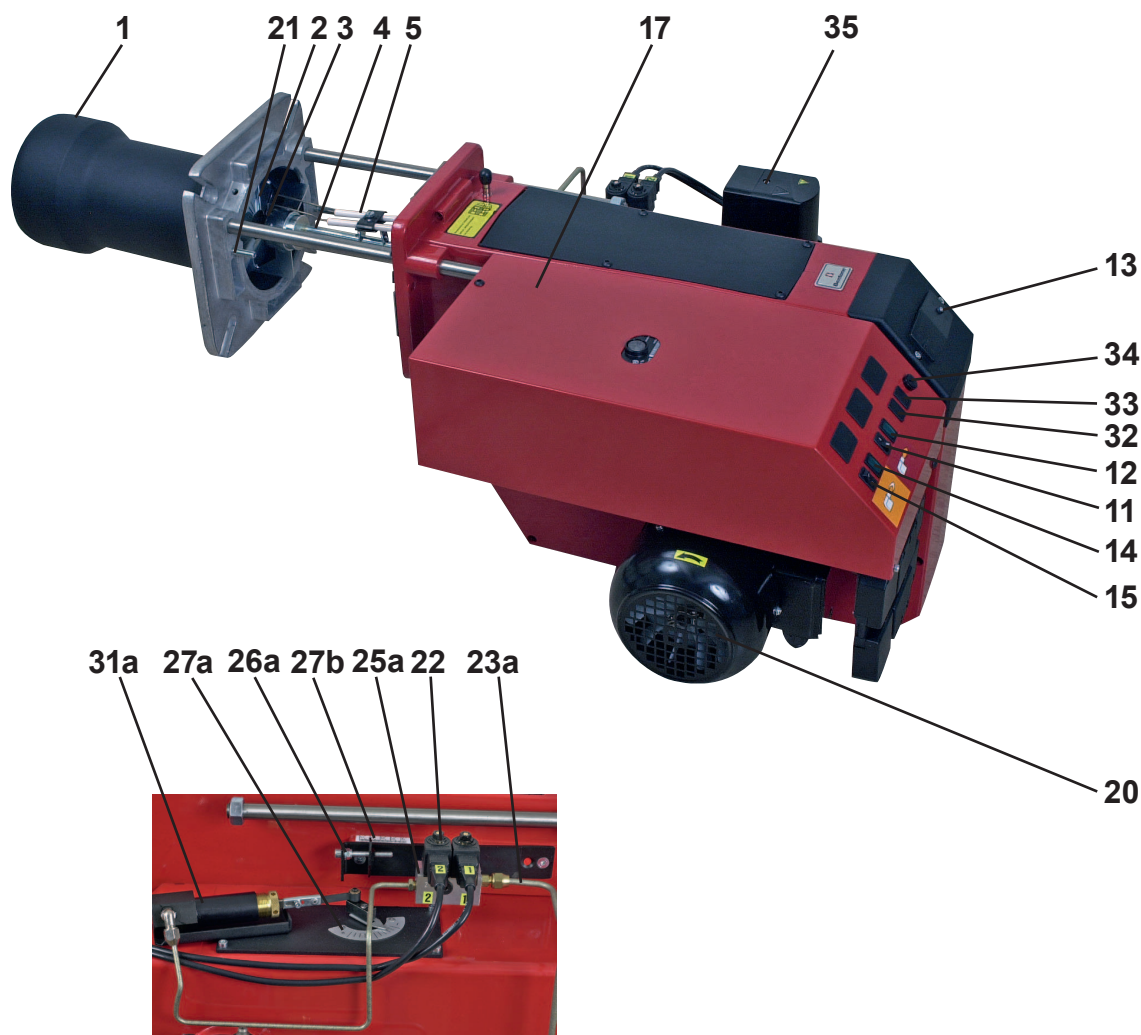


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# 1. GENERAL

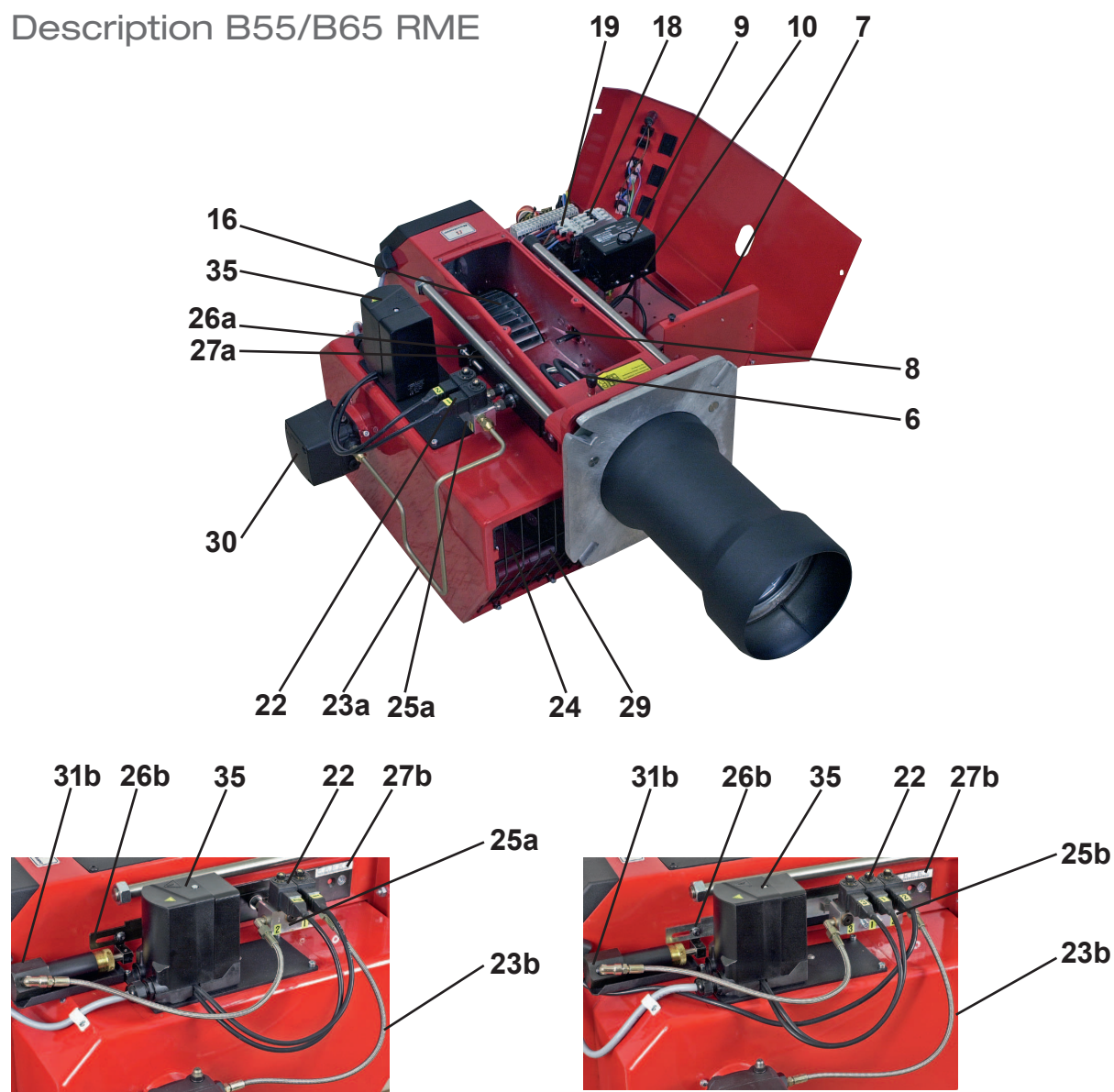
## 1.1 Description B55/B65 RME



### Components

- |                             |                                       |
|-----------------------------|---------------------------------------|
| 1. Flame cone               | 21. Solenoid valves                   |
| 2. Brake plate              | 22. Magnetventiler                    |
| 3. Nozzle                   | 23a. Connecting pipe                  |
| 4. Nozzle assembly          | 25a. Solenoid valve bloc Stage 2      |
| 5. Ignition electrodes      | 26a. Nozzle assembly adjustment fixed |
| 11. Switch I-II             | 27a. Scale, air regulation            |
| 12. Indicating lamp Stage 2 | 27b. Scale, nozzle assembly           |
| 13. Cover, inspection glass | 31a. Adjustment device, air damper    |
| 14. Indicating lamp Stage 1 | 32. Switch II-III                     |
| 15. Switch 0-I              | 33. Indicating lamp Stage 3           |
| 17. Electric panel          | 34. Fuse                              |
| 20. Motor                   | 35. Damper motor                      |

## Description B55/B65 RME

**Components**

- |                                 |   |
|---------------------------------|---|
| 6. Ignition cables              | 25a. Solenoid valve bloc Stage 2            |
| 7. Ignition transformer         | 25b. Solenoid valve bloc Stage 3            |
| 8. Photocell                    | 26a. Nozzle assembly adjustment             |
| 9. Control box                  | 26b. Nozzle assembly adjustment hydraulique |
| 10. Front plate, relay base     | 27a. Scale, air regulation                  |
| 16. Fan wheel                   | 27b. Scale, Nozzle assembly                 |
| 18. Contactor                   | 29. Air damper                              |
| 19. Thermal overload protection | 30. Pump                                    |
| 22. Solenoid valve              | 31b. Adjustment device, Nozzle assembly     |
| 23a. Connecting pipe            | 35. Damper motor                            |
| 23b. Hydraulic hose             |   |
| 24. Air intake                  |   |



## 2. GENERAL INSTRUCTIONS

### 2.1 Manual

- The contents of this manual are to be observed by all who work for any reason on the unit and its appertaining system parts.
- This manual is intended especially for authorised personnel.
- This manual is to be regarded as part of the burner and shall always be available near the place of installation.

### 2.2 Safety directions

The electrical installation shall be made according to valid regulations for heavy current and in a professional way, so that the risk of leaking oil, fire or personal injury is avoided.

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.

### 2.3 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.

## 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 CO<sub>2</sub> or O<sub>2</sub> 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 CO<sub>2</sub>-content and consequently the air volume will then 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.

## Installation instructions

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

## 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.

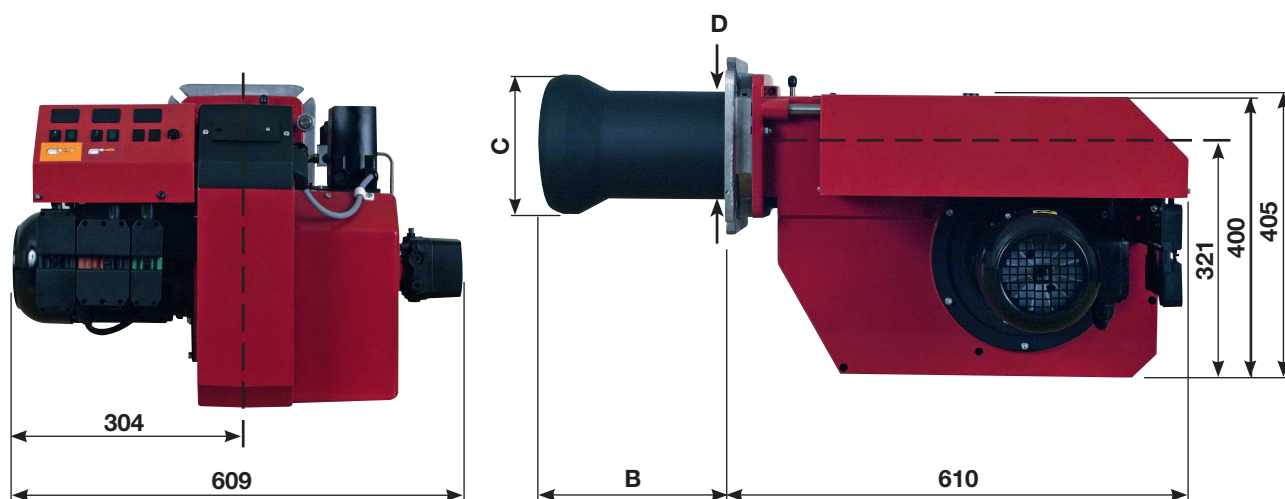
The oil pipe and electric cable should be fitted so that the burner can be placed on the floor for inspection of the combustion device.

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

### 3. TECHNICAL DATA

#### 3.1 Type designation B55-2/B65-2 RME

#### 3.2 Dimensions



	Length of burner tube	Flange Measure B	Burner tube Measure C	Burner tube Measure D
B55				
Standard 1	303	273	160	155
Standard 2	403	373	160	155
Standard 3	503	473	160	155
B65				
Standard 1	288	258	200	155
Standard 2	388	358	200	155
Standard 3	488	458	200	155

#### 3.3 Recommended nozzle and pressure

Because of the different boiler types, combustion chamber geometries and combustion chamber loads that exist, it is not possible to specify a given spray angle or spray pattern. It should be noted that the spray angle and spray pattern will vary depending on the pump pressure.

##### Nozzle

45°S Danfoss  
45°B Danfoss  
60°S Danfoss  
60°B Danfoss

##### Pump pressure

4 bar (12 - 16 bar)  
On burners equipped with hydraulic air control or optimization the oil pressure should not be less than 14 bar.



### 3.4 Output range and nozzles recommended

	Oljemängd	Effekt		Rekommenderat	munstycke	Rekommenderat
	kg/h	kW	Mcal/h	Vinkel	Danfoss	pumptryck
B55-2H, B55-2, B55-2R	14-67	166-795	143-685	45°-60°	S, B	14 bar
B55-3R	14-64	166-759	143-654	45°-60°	S, B	14 bar
B65-2H, B65-2, B65-2R	24-99	285-1174	246-1012	45°-60°	S, B	14 bar
B65-3R	24-99	285-1174	246-1012	45°-60°	S, B	14 bar

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

### 3.5 Electric Specification

Type	Motor	The recommended main fuse, motor	Control power	Sound
<b>B 55</b>	230/400V, 50Hz, 3,5/2,5A, 0,75kW 2860 Rpm	C10A	230V1F~2,5A	89 dBA ± 0,5 dBA
<b>B 65</b>	230/400V, 50Hz, 6,5/4,0A, 1,5kW, 2890 Rpm	C10A	230V1F~2,5A	87 dBA ± 0,5 dBA

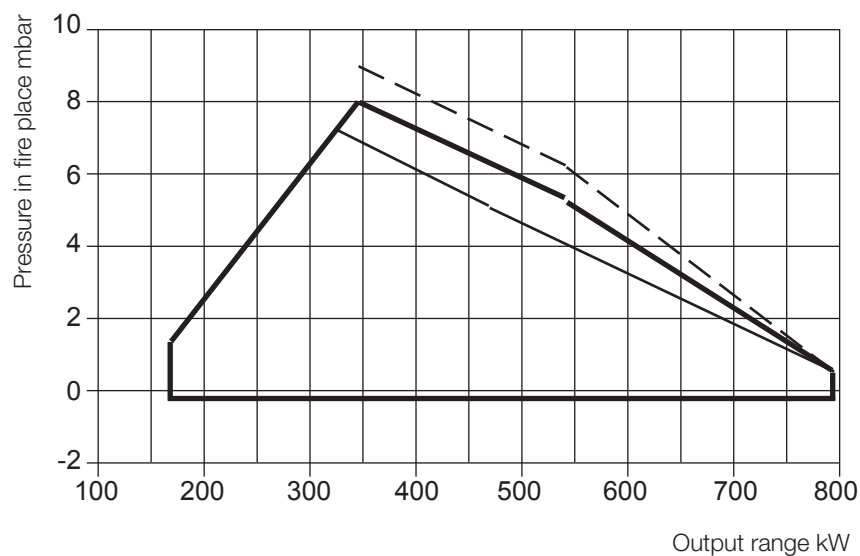
### 3.6 Working field

#### B55-2

14-67 kg/h

166-795 kW

— B55-2R  
 — B55-2H/B55-2  
 - - - Measured (test)

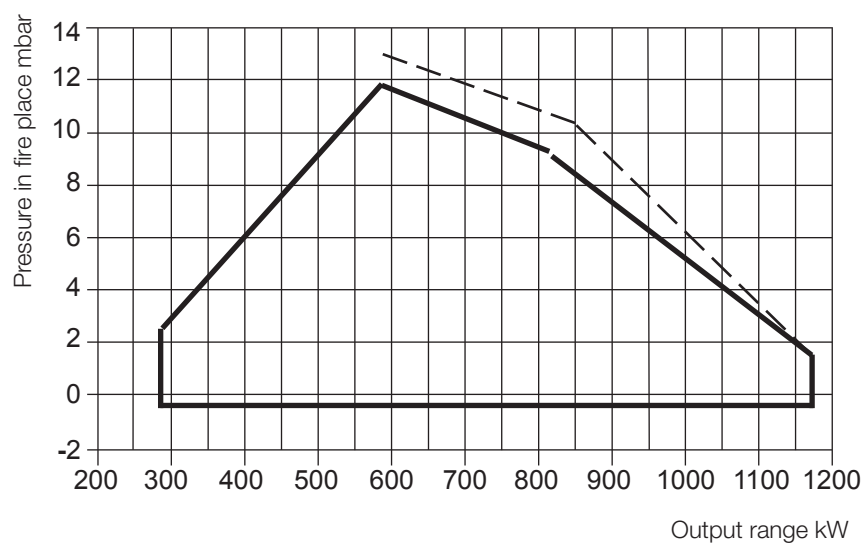


#### B65

24-99kg/h

285-1174 kW

— B65  
 - - - Measured (test)



Unbroken line is the approved working field as per EN267.

### 3.7 Nozzle table

Pump pressure bar

Gph	10			11			12			13		
	kg/h	kW	Mcal/h	kg/h	kW	Mcal/h	kg/h	kW	Mcal/h	kg/h	kW	Mcal/h
2,75	10,24	121	104	10,73	127	109	11,21	133	114	11,67	138	119
3,00	11,16	132	114	11,71	139	119	12,23	145	125	12,73	151	130
3,50	13,03	154	133	13,66	162	139	14,27	169	146	14,85	176	151
4,00	14,89	176	152	15,62	185	159	16,31	193	166	16,97	201	173
4,50	16,75	199	171	17,57	208	179	18,35	218	187	19,10	226	195
5,00	18,62	220	190	19,52	231	199	20,39	242	208	21,22	252	216
5,50	20,48	243	209	21,47	255	219	22,43	266	229	23,34	277	238
6,00	22,34	265	228	23,42	278	239	24,47	290	250	25,46	302	260
6,50	24,20	287	247	25,37	301	259	26,51	314	270	27,58	327	281
7,00	26,06	309	266	27,33	324	279	28,55	339	291	29,70	352	303
7,50	27,92	331	285	29,28	347	299	30,59	363	312	31,83	377	325
8,00	29,79	353	304	31,23	370	318	32,63	387	333	33,95	403	346
8,50	31,65	375	323	33,18	393	338	34,66	411	353	36,07	428	368
9,00	33,59	398	343	35,14	417	358	36,71	435	374	38,19	453	389
9,50	35,37	419	361	37,09	440	378	38,74	459	395	40,31	478	411
10,00	37,23	441	380	39,04	463	398	40,78	484	416	42,44	503	433
11,00	40,96	486	418	42,94	509	438	44,86	532	457	46,68	554	476
12,00	44,68	530	456	46,85	556	478	48,94	580	499	50,92	604	519
14,00	52,12	618	531	54,65	648	557	57,10	677	582	59,41	705	606
16,00	59,57	706	607	62,46	741	637	65,26	774	666	67,90	805	692
18,00	67,02	795	683	70,27	833	717	73,41	871	749	76,39	906	779
20,00	74,47	883	759	78,08	926	796	81,57	967	832	84,87	1007	865

The table applies to oil with a viscosity of 4,4 mm<sup>2</sup>/s (cSt) with density 830 kg/m<sup>3</sup>.

## Nozzle table

Pump pressure bar

Gph	14			15			16			17		
	kg/h	kW	Mcal/h	kg/h	kW	Mcal/h	kg/h	kW	Mcal/h	kg/h	kW	Mcal/h
2,75	12,11	144	123	12,53	149	128	12,95	154	132	13,35	158	136
3,00	13,21	157	135	13,67	162	139	14,13	168	144	14,56	173	148
3,50	15,42	183	157	15,95	189	163	16,49	196	168	16,99	201	173
4,00	17,62	209	180	18,23	216	186	18,84	223	192	19,42	230	198
4,50	19,82	235	202	20,51	243	209	21,20	251	216	21,84	259	223
5,00	22,03	261	225	22,79	270	232	23,55	279	240	24,27	288	247
5,50	24,23	287	247	25,07	297	256	25,91	307	264	26,70	317	272
6,00	26,43	313	270	27,49	326	280	28,27	335	288	29,13	345	297
6,50	28,63	340	292	29,63	351	302	30,62	363	312	31,55	374	322
7,00	30,84	366	314	31,91	378	325	32,98	391	336	33,98	403	347
7,50	33,04	392	337	34,19	405	349	35,33	419	360	36,41	432	371
8,00	35,25	418	359	36,47	433	372	37,69	447	384	38,80	460	396
8,50	37,45	444	382	38,74	459	395	40,04	475	408	41,26	489	421
9,00	39,65	470	404	41,02	486	418	42,40	503	432	43,69	518	446
9,50	41,85	496	427	43,30	514	442	44,75	531	456	46,11	547	470
10,00	44,06	523	449	45,58	541	465	47,11	559	480	47,11	559	480
11,00	48,46	575	494	50,14	595	511	51,82	615	528	53,40	633	545
12,00	52,87	627	539	54,70	648	558	56,53	670	576	58,25	691	594
14,00	62,68	732	629	63,81	757	651	65,95	778	669	67,96	806	693
16,00	70,49	836	719	72,93	865	744	75,38	894	769	77,67	921	792
18,00	79,30	940	809	82,05	973	837	84,80	1006	865	87,38	1036	891
20,00	88,11	1045	899	91,17	1081	930	94,22	1117	961	97,09	1151	990

The table applies to oil with a viscosity of 4,4 mm<sup>2</sup>/s (cSt) with density 830 kg/m<sup>3</sup>.

## 4. INSTALLATION

### 4.1 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.

### 4.2 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.

### 4.3 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 1½" so that the filter cartridge can easily be replaced.

### 4.4 Electrical connections

The main power switch must be turned off before beginning electrical installation. If the boiler has a 7-pin and a 4-pin Eurostecker connector these will often connect straight to the burner. If not, use the connectors supplied. A 5-pin connector supplies the burner motor with a separate 3-phase supply. See connection under the Electrical equipment heading.

### 4.5 Choice of nozzle

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



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

### 4.6 Setting of the brake plate and air flow

Basic burner settings can be made before commissioning as shown in the diagram. See Basic settings. Note that these are just basic settings and must be correctly adjusted when the burner has been started. Flue gas analysis and soot measurement should be carried out at this time.

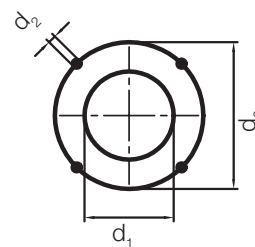
## 4.7 Burner installation

### Hole pattern

Check that the hole pattern on the boiler matches the pattern on the burner flange.

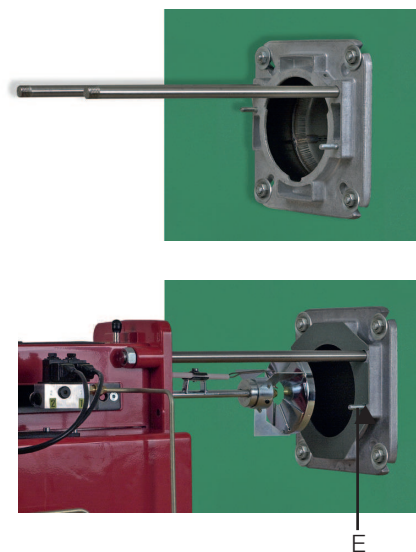
Flame head	$d_1$	$d_2$	$d_3$
B55	(160)* 165	M12	(226)* 254-295
B65	(160)* 210	M12	(226)* 254-295

The hole pattern can be reduced if the burner pipe is fitted from the front and the heels in the flange are ground off.



### 4.8 Installing the burner

1. Separate the burner body and the flange.
2. Fit the flange and gasket on the boiler.
3. Insulate between the burner pipe and boiler door to reduce heat radiation.
4. Slide the burner body on to the guides.
5. Pull the brake plate off the oil pipe.
6. Fit the chosen nozzles (see Technical data).
7. Fit the brake plate and check the ignition electrodes (see Servicing the burner).
8. Slide the burner together and secure it with the nuts (E).



### 4.9 Oil lines

1. Check the size of the oil line (see Pump instructions).
2. An oil filter (1/2") must be fitted to the oil line. If an air trap is fitted then the oil filter should be fitted to the oil line before the air trap.
3. With a single pipe system the return plug must be removed (see Pump instructions).
4. When fitting oil hoses, check that the supply and return hoses are connected to the right couplings on the oil pump. The hoses must be positioned so that they are not subjected to tensile stress or sharp bending.
5. Bleed the oil system. The oil pump will be damaged if it is run dry.
6. The vacuum in the suction line should not exceed 0.3 bar during commissioning.

### 4.10 Electrical connections

1. Turn off the main power switch.
2. Connect the Eurostecker connectors (see Electrical equipment).
3. Check that the burner control switch (S1) is off.
4. Fit the Eurostecker connectors on the burner.
5. Turn on the main power switch.
6. Check the direction of rotation of the burner motor.





## 5. BASIC SETTINGS

### 5.1 Typical basic settings for B65-2

#### Choice of nozzle B65-2

Burner output = 770 kW

Nozzle Stage 1  $770 \times 0,6 = 460 \text{ kW}$   
 $460 / 11,86 = 38,8 \text{ kg/h}$

Nozzle Stage 2  $770 \times 0,4 = 310 \text{ kW}$   
 $310 / 11,86 = 26,1 \text{ kg/h}$

According to the table of nozzles this gives the following nozzles:

Stage 1 8,50 Gph

Stage 2 6,00 Gph

Pump pressure 14 bar

#### Basic settings B65-2

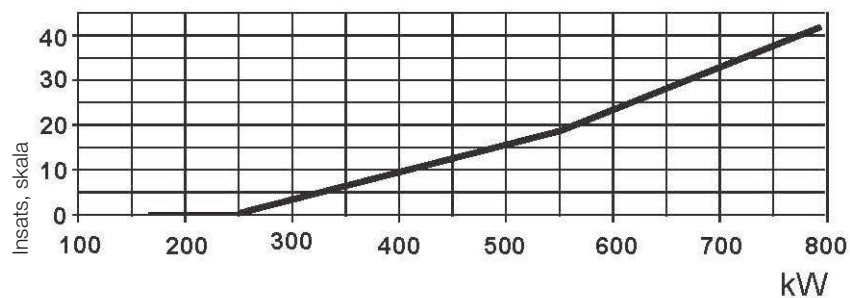
Power outputs and nozzle choice from example.

Nozzle assembly Stage 2 = 15

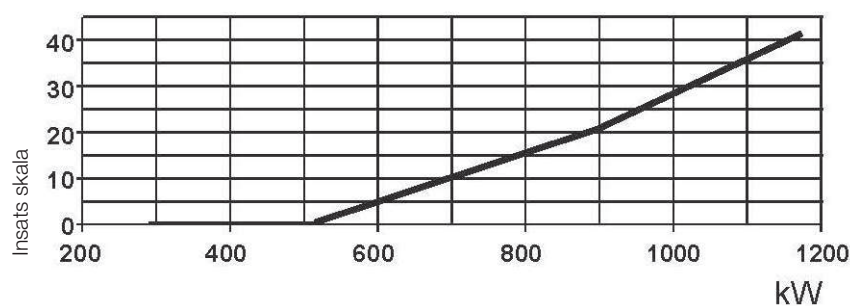
Damper motor	Closed = 0°	Blue cam
	Stage 1 = 25°	Orange cam
	MV 2 = 50°	Black cam
	Stage 2 = 65°	Red cam

The black cam for Stage 2 (MV 2) must be placed between the cams for Stage 1 and Stage 2. The positions of MV 2 are determined by the boiler characteristics when switching between stages, but for a basic setting the black cam should be placed in the middle.

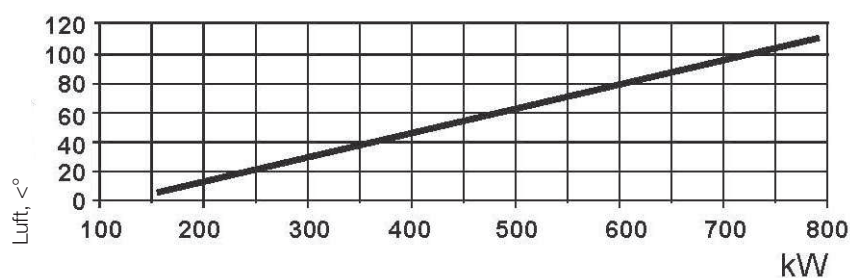
## 5.2 Set values for nozzle assembly B55



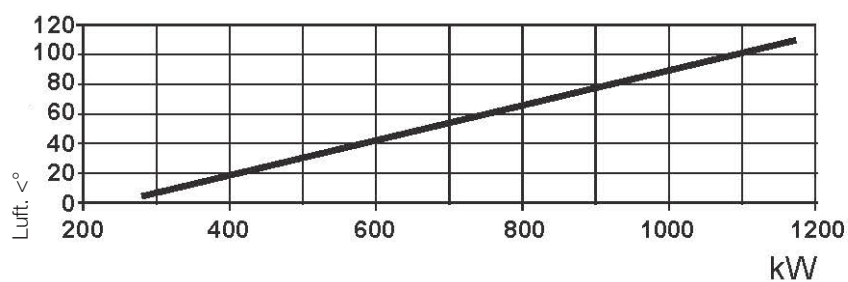
## 5.3 Set values for nozzle assembly B65



## 5.4 Set values for air damper B55



## 5.5 Set values for air damper B65



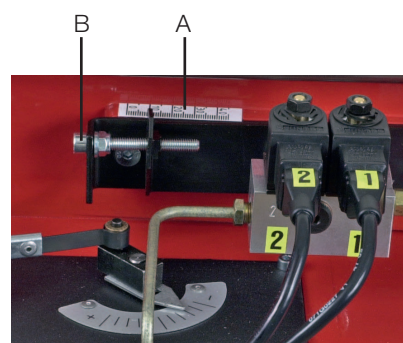
## 5.6 Nozzle assembly regulation – fixed brake plate

Nozzle assembly regulation is used to achieve the most favourable pressure drop possible across the brake plate.

Nozzle assembly regulation should be adjusted for Stage 2 output.

### Adjustment

Adjust to the desired position on the scale (A) using the set screw (B) (turning anti-clockwise reduces the pressure drop and moves the brake plate outwards). If pulsation occurs, the pressure drop across the brake plate can be altered until pulsation stops.



## 5.7 Damper motor 2-Stage

The damper motor rotates the damper between three preset positions. These positions are controlled at the motor by micro-switches, the switching positions of which are set using the coloured cams. There is also a black cam, which controls the activation of solenoid valve 2.

If the air flow requires adjustment: Remove the cover from the damper motor and change the positions of the cams by turning them with the aid of the tool supplied. To deactivate a cam while you are turning it we recommend that you switch to a different stage and then switch back after adjustment is complete in order to check the result.

### Stage 1

Adjust the operating switch to Stage 2 (II)

- Reduce the air volume: Turn orange cam towards 0°
- Increase the air volume: Turn orange cam towards 90°

Adjust the operating switch back to low capacity and check.

### Stage 2

Adjust the operating switch to Stage 1 (I).

- Reduce the air volume: Turn red cam towards 0°.
- Increase the air volume: Turn red cam towards 90°

If the red cam is moved, change the black cam as much. Adjust the operating switch back to Stage 2 and ensure that the correct air volume has been obtained.

### Closed

The blue cam is the limit position for fully closed damper and it is normally not necessary to change it.

### Releasing

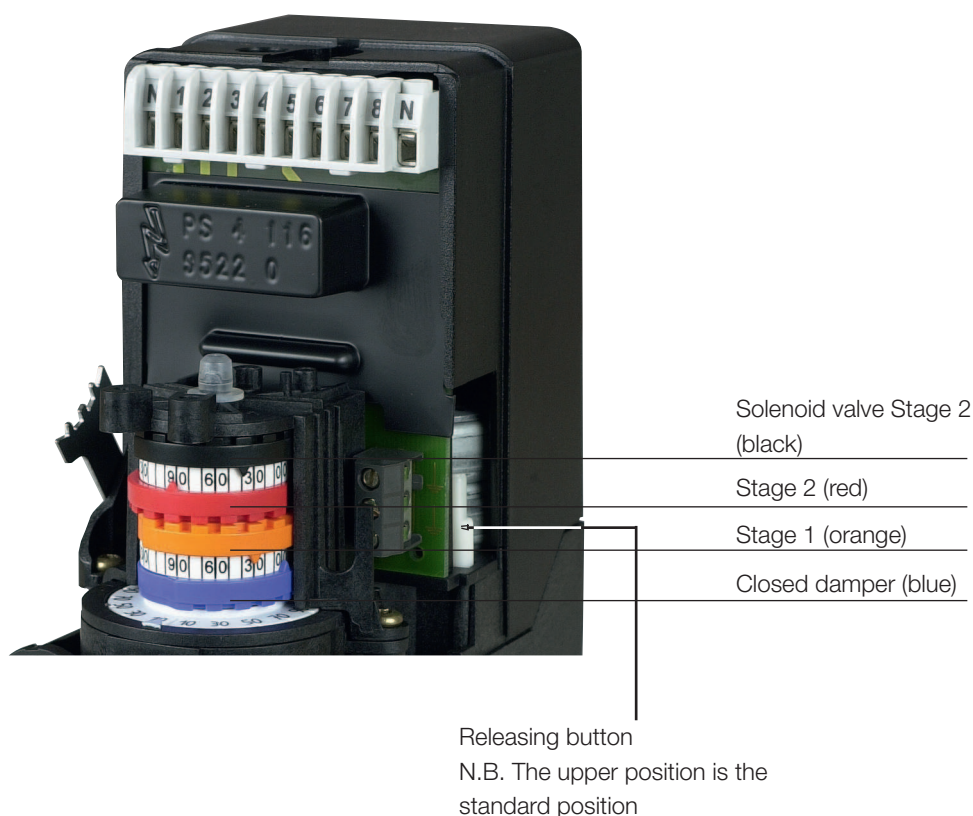
The damper motor can be released using the white release button. This feature simplifies replacement of the damper motor.

To release

Press down the shaft and slide it outwards until it disengages from the milled slot.

To engage.

Slide the shaft inwards and release. Adjust the position of the motor so that the cogs mesh with each other.



## 6. MAINTENANCE THE BURNER

### 6.1 Servicing the burner device

#### Removal and fitting

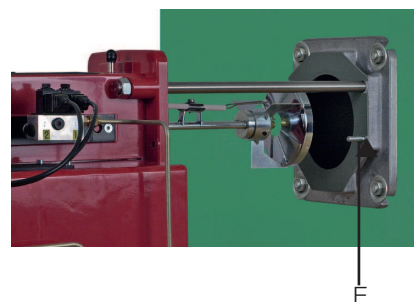
1. Turn off the main power switch and disconnect the Eurostecker connectors from the burner.
2. Undo the nuts (E) and pull out the burner body on its guides.
3. Undo and remove the brake plate from the oil pipe.
4. Unscrew the nozzles.
5. Fit the nozzles.
6. Fit the brake plate (see Adjusting the brake plate).
7. Check the ignition electrodes (see Adjusting ignition electrodes). Replace if necessary.
8. Slide the burner together and secure it with the nuts (E).
9. Connect the Eurostecker connectors and turn on the main power switch.
10. Check combustion\*.

**Note:** After servicing/replacing components that affect combustion, a flue gas analysis and soot measurement must be carried out on the installation.

**Note:** If nozzles are dirty always replace them with new ones. Do not clean them.

On boilers with a hinged door, the door can be opened and the burner pipe can be removed from the flange and pulled forwards.

With burners that have an extended burner tube, the burner body must be lifted off the guides, or the oil pipe must be disconnected from the solenoid valves to be removed for servicing.

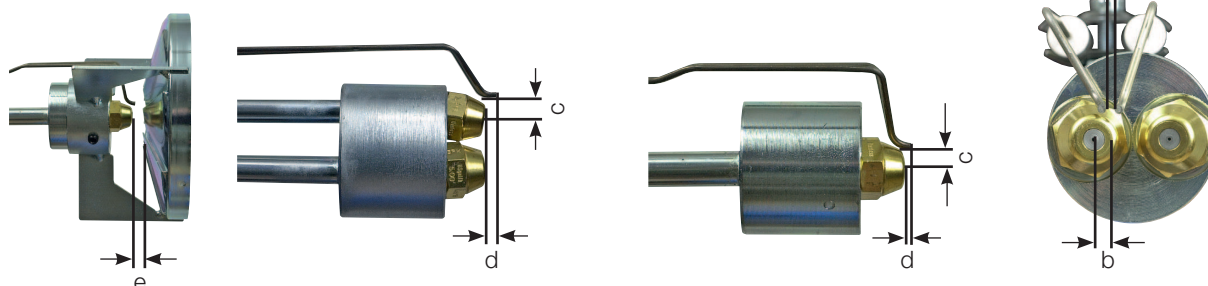


### 6.2 Adjusting the ignition electrodes and brake plate

Adjustment dimensions for ignition electrodes.

Burner, Type	a	b	c	d	e
B55-2	2,5-3,0	2,0	6,5-7,0	2,0	6,0-7,0
B65-2	2,5-3,0	2,0	6,5-7,0	2,0	10,0-12,0

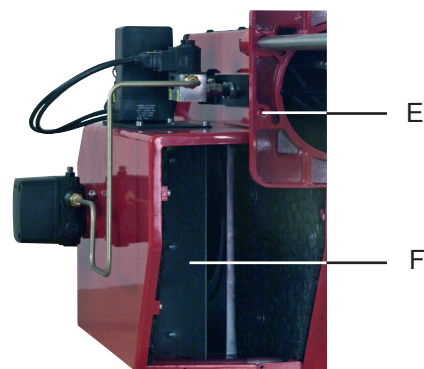
**Note!** It is important that the spark does not strike the brake plate or nozzle.



## 6.3 Servicing the air damper

### Removal and fitting

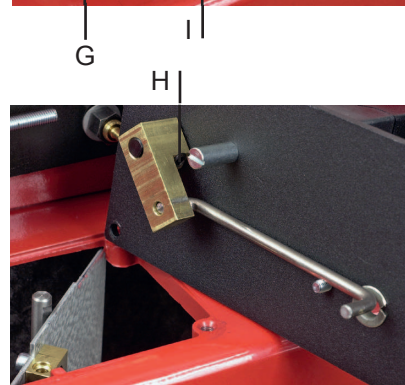
1. Turn off the main power switch and disconnect the Eurostecker connectors from the burner.
2. Undo the nuts (E) and pull out the burner body on its guides.
3. Remove the intake grille from the air intake.
4. Release the damper motor.
5. Clean the air damper (F) and the intake. Lubricate the damper shaft if applicable.
6. Re-engage the damper motor.
7. Fit the intake grille over the air intake.
8. Slide the burner together and secure it with the nuts (E).
9. Connect the Eurostecker connectors and turn on the main power switch.
10. Check combustion\*



## 6.4 Replacing the damper motor

### Removal and fitting

1. Turn off the main power switch and disconnect the Eurostecker connectors from the burner.
2. Note the positions of the cables and then disconnect the cables from the damper motor.
3. Release the damper motor and lock it at 30°.
4. Undo the screws (G) that secure the mounting plate for the damper motor.
5. Raise it carefully so that the air damper stays in the air intake.
6. Disconnect the (H) link arm from the motor shaft.
7. Separate the damper motor from the mounting plate (I).
8. Refit the damper motor on the mounting plate.
9. Connect the link arm to the damper motor shaft. It is important that the screw is at right angles to the plane of the shaft.
10. Release the damper motor and lock it at 30°.
11. Fit the mounting plate by guiding the link arm into the attachment point on the air damper and the air damper shaft into the mounting plate (make sure that the bushings are fitted between the mounting plate and damper shaft).
12. Release the damper motor and check that the damper moves freely. Close the damper and zero the graduated scale on the damper motor.
13. Make the electrical connections to the damper motor.
14. Reset the damper motor cams.
15. Connect the Eurostecker connectors and turn on the main power switch.
16. Check combustion.\*





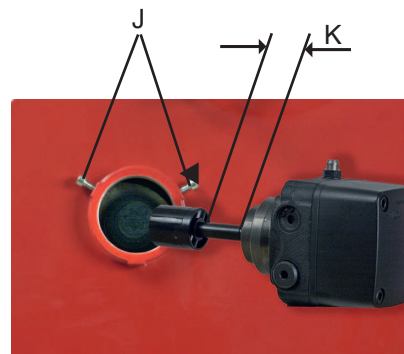
## 6.5 Replacing the oil pump B55/B65

### Removal and fitting

1. Turn off the main power switch and disconnect the Eurostecker connectors from the burner.
2. Disconnect the oil hoses from the pump.
3. Undo the screws (J) and pull out the oil pump.
4. Measure the distance between the pump mounting and the pump coupling (K).
5. Transfer the pump coupling to the new pump and adjust to give the same spacing between the pump and pump coupling as before (K).
6. Fit the oil pump on the burner and tighten the screws (J). (It is important that splines on the pump shaft align correctly with the pump coupling.)
7. Fit the oil hoses.
8. Connect the Eurostecker connectors and turn on the main power switch.
9. Bleed the pump, start the burner and adjust to the correct oil pressure.
10. Check combustion.\*

### Note:

After servicing/replacing components that affect combustion, a flue gas analysis and soot measurement must be carried out on the installation.



## 7. PUMP INSTRUCTION

### PUMP E4NC-1069 7P

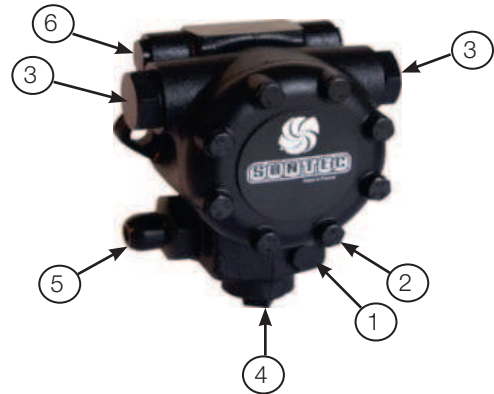
#### 7.1 Technical data

* Viscosity range:	3.0 to 75.0 mm <sup>2</sup> /s
Pressure range:	14-30 bar
Oil temperature:	0 to +130°C
Nozzle capacity at viscosity 20 mm <sup>2</sup> /s	170-185 l/h
Gear capacity:	190 l/h
Max. pressure on the suction and return side:	3.5 bar

- \* Oils of higher viscosity may be used if it is pumped to the burner oil pump or if the oil viscosity is lowered to below 75 mm<sup>2</sup>/s by it being kept hot.

#### 7.2 Components

1. Manometer connection G 1/8"
2. Connection for nozzle G 1/4"
3. Suction line G 1/2"
4. Return line G 1/2"
5. Pressure regulation with screwdriver
6. Holes Immersion heaters
7. Filter
8. Head gasket
9. Cover



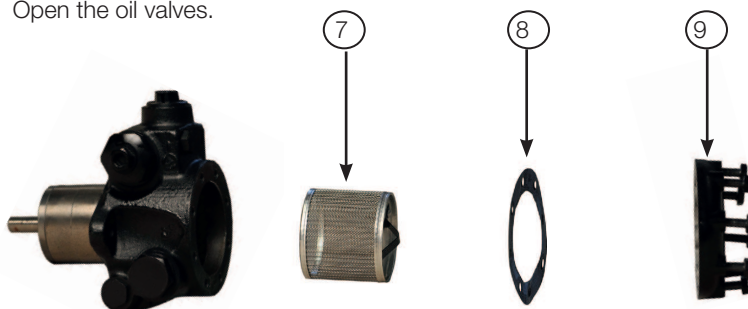
#### 7.3 Oil connection

The pump should be connected using a two-pipe system when it is operated using oils with higher viscosity. A one-pipe system is not recommended.

#### 7.4 Changing the filter

Change the oil pump oil filter in accordance with the following.

- Close the oil valves
- Unscrew the cover on the pump.
- Replace the oil filter.
- Replace head gasket.
- Mount the cover on the pump.
- Open the oil valves.

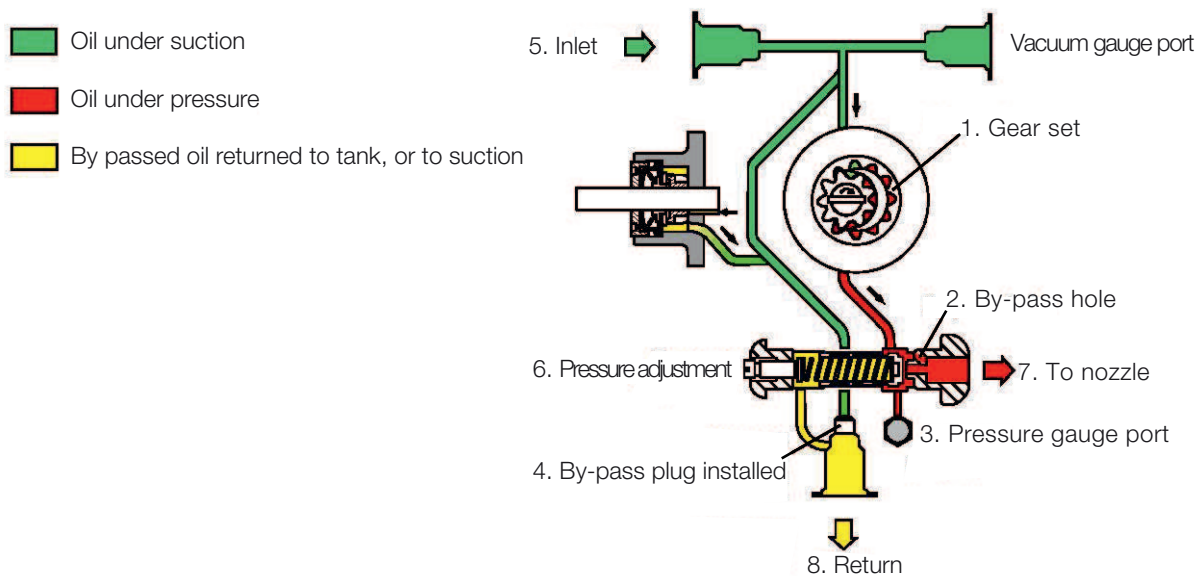


## 7.5 Function

The pump gear (1) draws oil through the pump suction port (5) from the tank through the filter in the pump and transports the oil to the valve (6) which controls the oil pressure to the nozzle. Oil that does not go through the outlet (7) to the nozzle will be bypassed (2) through the valve (6) back to the return port (8) on the pump.

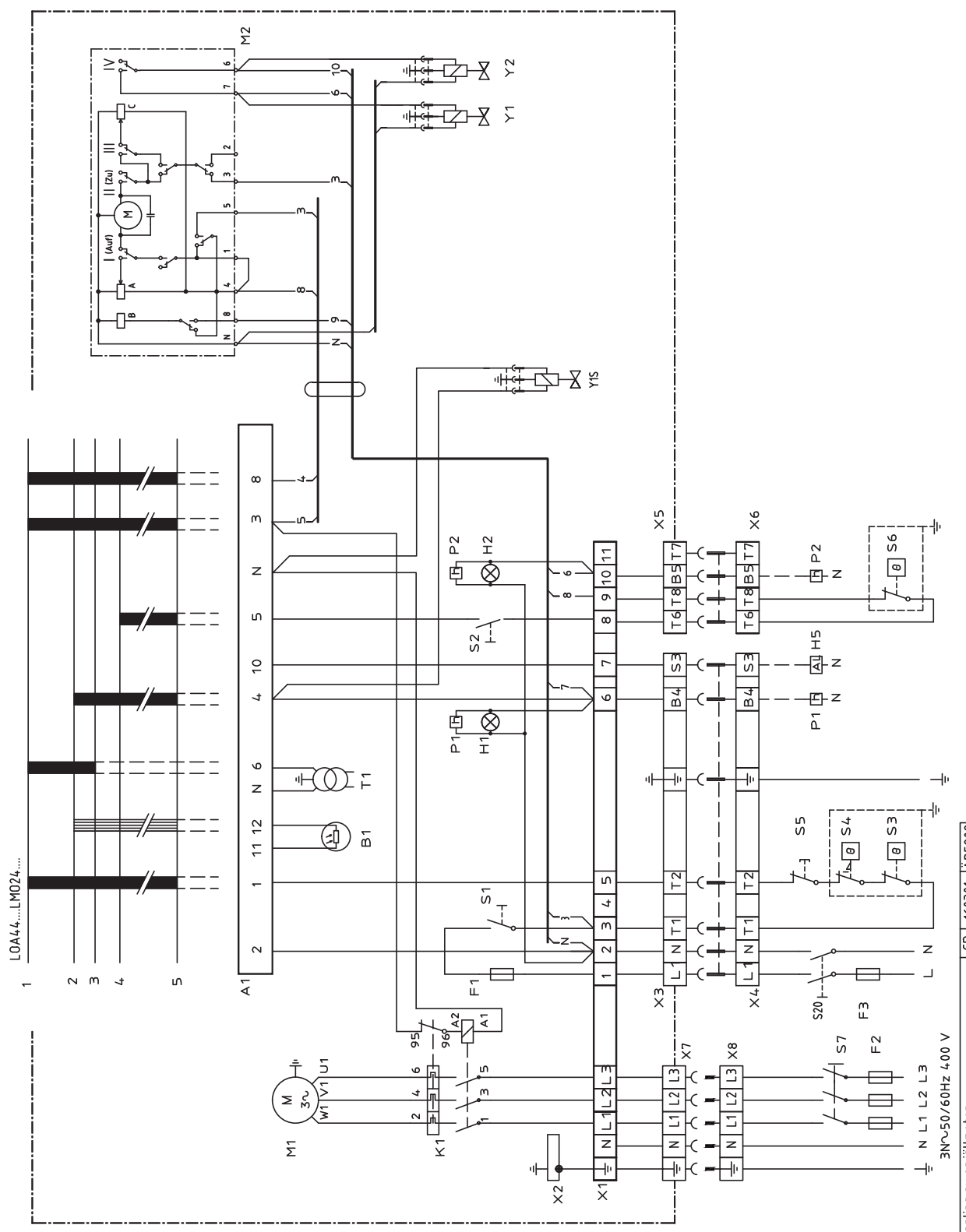
## 7.6 Preheating pump

The pump has the facility to fit an immersion heater to providing preheating.



## 8. ELECTRIC EQUIPMENT

## 8.1 Wiring diagram LMO24.255...



## 8.2 List of components

A1	Oil burner control	S7	Main switch 3-fas
B1	Photoresistor	S20	Main switch 1-fas
F1	Operating fuse	T1	Ignition transformer
F2	Fuse	X1	Connection terminal board X2 Earth terminal
F3	Fuse	X3	Plug-in contact "Euro", burner
H1	Lamp, low capacity	X4	Plug-in contact "Euro", boiler
H2	Lamp, high capacity	X5	Plug-in contact "Euro", high/low burner
H5	Alarm signal 230V	X6	Plug-in contact "Euro", high/low boiler
K1	Thermal overload protection	X7	Plug-in contact "Euro" 3-phase, burner
M1	Burner motor	X8	Plug-in contact "Euro" 3-phase, boiler
M2	Damper motor SQN75.244A21B	Y1	Solenoid valve 1
S1	Operating switch	Y2	Solenoid valve 2
S2	Operating switch, high/low capacity	Y1S	Safety solenoid valve
S3	Operation thermostat		
S4	Temperature limiter		
S5	Micro switch for hinged door		
S6	Control thermostat, high/low		

If S6 is missing connection between T6 and T8.

Mains connection and fuse in accordance with local regulations.

Max loading K1

Connection A1,A2 / 95, 96 / 97, 98 Max 0,2A/15W

## 8.4 Function LMO24.255...

### 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 1 opens (2).

### 2. Solenoid valve 1 opens

Oil mist is formed and ignited. The photocell indicates a flame.

### 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.

### 4. Full load thermostat ON

The burner is in operating position and can now change between high and low capacity.

### 4-5. 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.

## 8.3 Technical data LMO24.255...

	LMO24
Pre-ignition period:	25 s
Pre-ventilation period:	26 s
Post-ignition period:	5 s
Safety period:	< 5 s
Re-connection after release:	< 1 s
Reaction time flame extinction:	< 1 s
Ambient temperature:	-5 - +60°C
Min. current with flame:	45 µA
Max current when dark, start:	5,5 µ A

### 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).



## 8.5 Colour codes

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

## 8.6 Fault codes

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

## 9. FAULT LOCATION

### 9.1 Burner will not start

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

### 9.2 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	Adjust thermostat
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	Check that tank, oil lines, solenoid valves, pump and nozzle are in good condition
	No oil supply	Adjust the burner
Burner stops	Too great a pressure drop at brake plate	Correct the boiler draught
	Too strong draught prevents flame forming	Check the ignition transformer. Check the ignition electrode settings and ceramics
	No spark	

### 9.3 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
	Nozzle partially blocked	Replace nozzle
Burner pulsates at start	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

# EU Declaration of conformity



## 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](http://www.bentone.com)

Enertech AB  
Box 309  
S-341 26 LJUNGBY

Ljungby September 26<sup>th</sup>, 2017

Håkan Lennartsson

Managing Director

Enertech AB

# 11. OIL BURNERS MAINTENANCE INSTRUCTION

## 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 swing 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.



