



Providing sustainable energy solutions worldwide

Installation and Maintenance instruction  
**B45-2 RME**



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# 1. GENERAL INSTRUCTIONS

## 1.1 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.

## 1.2 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.

### 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.

Firing with EO1 should be conducted the last few hours at the end of the firing season.

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.

Firing with EO1 should be conducted the last few hours at the end of the firing season.

## 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.

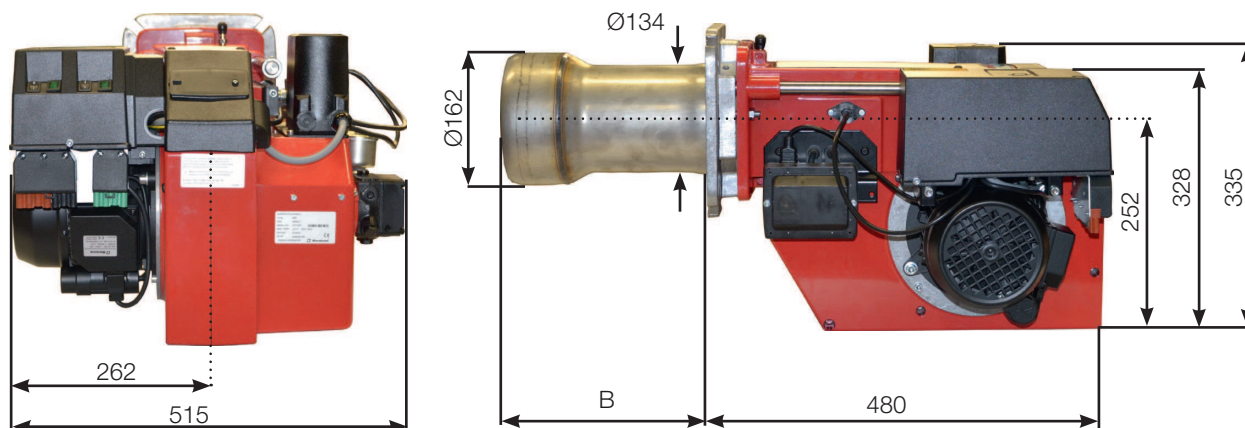
The temperature in the oil line should be kept as constant as possible. Avoid exposing the line to excessive cold which may cause blockages.

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.

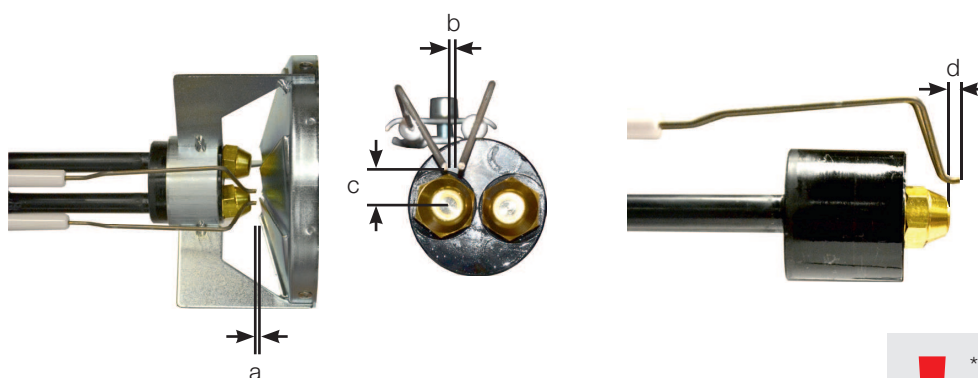
Oil hoses must be of a quality designed for FAME (RME).

## 2. TECHNICAL DATA

### 2.1 Dimensions



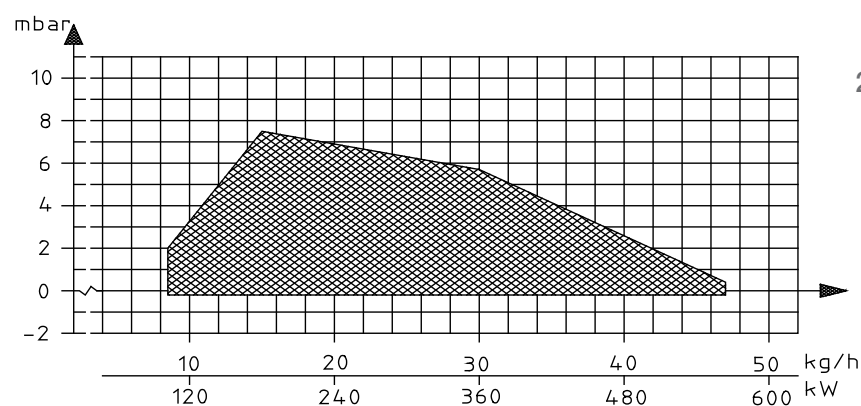
### 2.2 Setting of ignition electrodes and brake plate



a	b	c	d
5,0-6,0	3,5-4,0	7,0-9,0	2,0-3,0

Insertion length, burner tube	Burner tube, Dimension B
270	238
370	338

**!** \*NB It is important that the spark does not strike against the brake plate or nozzle

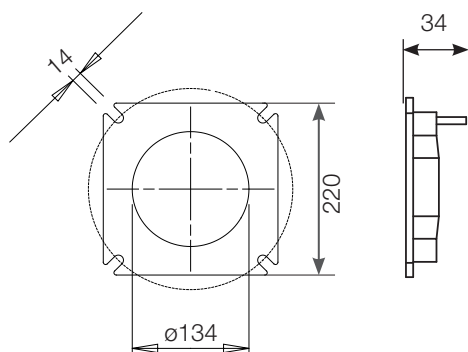


#### 2.2.1 Burner output

8,5	-	45,5	kg/h
101	-	540	kW

## 2.3 Dimension, flange

B45-2 RME



## 2.4 Recommended nozzle and pressure

Because of the various boiler types with varying furnace geometries and furnace loads, it is impossible to commit to a certain scattering angle or a specific distribution pattern.

It should be noted that the scattering angle and distribution pattern changes with pump pressure.

Nozzle:	45° Solid/semi-solid
	60° Solid/semi-solid
	80° Solid/semi-solid
Pump pressure	14 bar (8-28 bar) <sup>1)</sup>



The burner pump is factory set at 14 bar and test operated using Roadway 80.



## 2.5 NOZZLE TABLE

Pump pressure bar

Gph	8		10		12		14	
	kg/h	kW	kg/h	kW	kg/h	kW	kg/h	kW
1,00	3,33	39	3,72	44	4,08	48	4,40	52
1,10	3,66	43	4,09	48	4,48	53	4,84	57
1,20	3,99	47	4,47	53	4,89	58	5,29	63
1,25	4,16	49	4,65	55	5,10	60	5,51	65
1,35	4,49	53	5,02	59	5,50	65	5,95	70
1,50	4,98	59	5,58	66	6,11	72	6,60	78
1,65	5,49	65	6,14	73	6,73	80	7,27	86
1,75	5,82	69	6,51	77	7,14	85	7,71	91
2,00	6,65	79	7,45	88	8,16	97	8,81	104
2,25	7,49	89	8,38	99	9,18	109	9,91	118
2,50	8,32	99	9,31	110	10,19	121	11,01	131
2,75	9,15	108	10,24	121	11,21	133	12,11	144
3,00	9,98	118	11,16	132	12,23	145	13,21	157
3,50	11,65	138	13,03	15	14,27	169	15,42	183
4,00	13,31	158	14,89	176	16,31	193	17,62	209
4,50	14,97	177	16,75	199	18,35	218	19,82	235
5,00	16,64	197	18,62	220	20,39	242	22,03	261
5,50	18,30	217	20,48	243	22,43	266	24,23	287
6,00	19,97	237	22,34	265	24,47	290	26,43	313
6,50	21,63	256	24,20	287	26,51	314	28,63	340
7,00	23,29	276	26,06	309	28,55	339	30,84	366
7,50	24,96	296	27,92	331	30,59	363	33,04	392
8,00	26,62	316	29,79	353	32,63	387	35,25	418
8,50	28,28	335	31,65	375	34,66	411	37,45	444
9,00	29,95	355	33,59	398	36,71	435	39,65	470
9,50			35,37	419	38,74	549	41,85	496
10,00			37,23	441	40,78	484	44,06	523

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>.

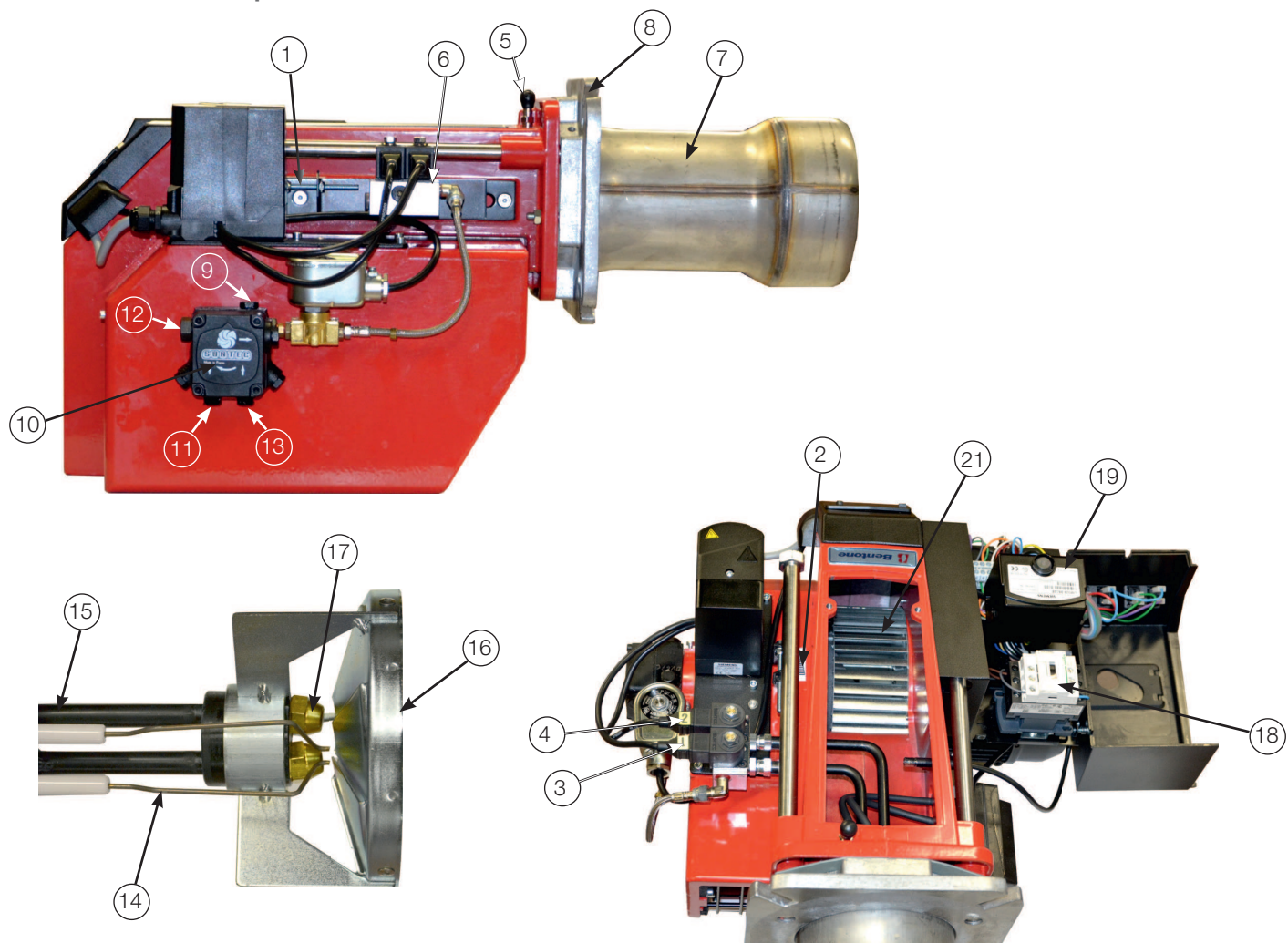


Pump pressure bar

Gph	16		18		20		22		24	
	kg/h	kW	kg/h	kW	kg/h	kW	kg/h	kW	kg/h	kW
1,00	4,71	56	4,99	59	5,26	62	5,53	66	5,77	68
1,10	5,18	61	5,49	65	5,79	69	6,07	72	6,34	75
1,20	5,65	67	5,99	71	6,32	75	6,62	78	6,92	82
1,25	5,89	70	6,24	74	6,58	78	6,90	82	7,21	85
1,35	6,36	75	6,74	80	7,11	84	7,45	88	7,78	92
1,50	7,06	84	7,48	89	7,89	93	8,27	98	8,64	102
1,65	7,77	92	8,24	98	8,69	103	9,11	108	9,51	113
1,75	8,24	98	8,78	104	9,21	109	9,66	115	10,09	120
2,00	9,42	112	9,99	118	10,53	125	11,04	131	11,53	137
2,25	10,60	126	11,24	133	11,85	140	12,43	147	12,98	154
2,50	11,77	140	12,48	148	13,16	156	13,81	164	14,42	171
2,75	12,95	154	13,73	163	14,48	171	15,19	180	15,86	188
3,00	14,13	168	14,98	178	15,79	187	16,18	192	17,30	205
3,50	16,49	196	17,48	207	18,43	218	19,33	229	20,19	239
4,00	18,84	223	19,98	237	21,06	250	22,10	262	23,08	274
4,50	21,20	251	22,47	266	23,69	281	24,85	295	25,96	308
5,00	23,55	279	24,97	296	26,33	312	27,61	327	28,84	342
5,50	25,91	307	27,47	326	28,96	343	30,38	360	31,73	376
6,00	28,27	335	29,97	355	31,59	374	33,14	393	34,62	411
6,50	30,62	363	32,46	385	34,22	406	35,90	426	37,49	445
7,00	32,98	391	34,96	415	36,86	437	38,56	457	40,38	479
7,50	35,33	419	37,46	444	39,49	468	41,42	491	43,26	513
8,00	37,69	447	39,96	474	42,14	499	44,19	524	46,15	547
8,50	40,04	475	42,45	503	44,75	531	46,95	557	49,03	581
9,00	42,40	503	44,95	533	47,39	562	49,71	589	51,92	616
9,50	44,75	531	47,45	563	50,02	593	52,47	622	54,80	650
10,00	47,11	559	49,94	592	52,66	624	55,23	655	59,69	684

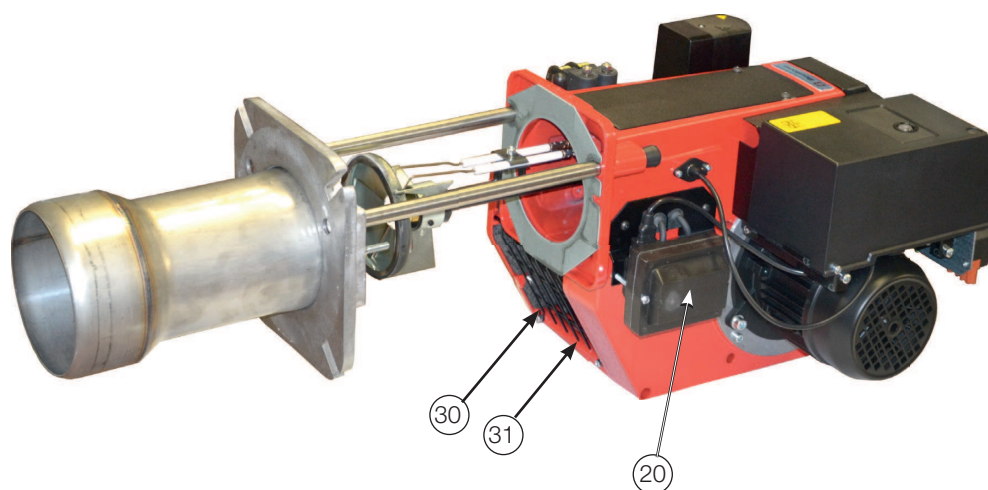
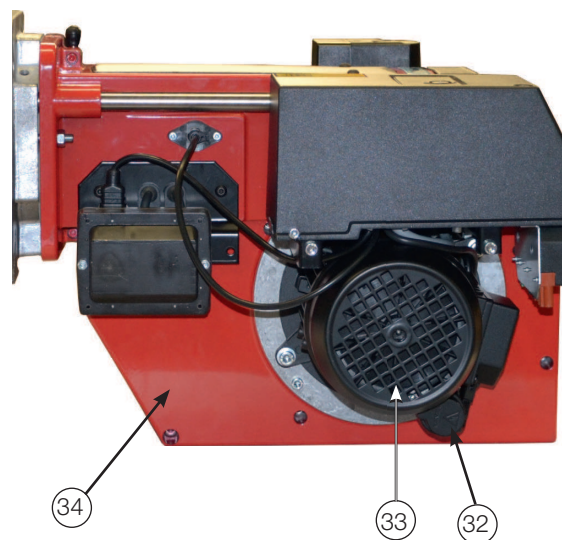
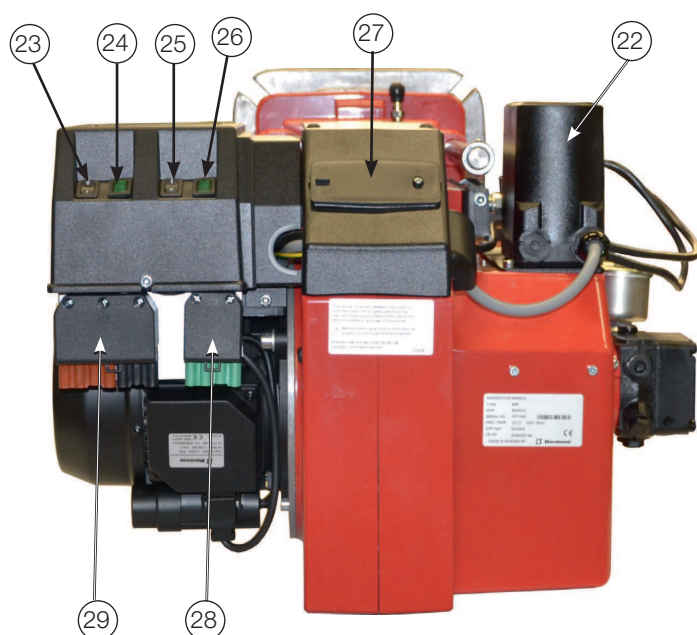
The table applies to oil with a viscosity of 4,4 mm<sup>2</sup>/s (cSt) with density 830 kg/m<sup>3</sup>.

## 2.6 Description B45-2



### 2.6.1 Components

- |                                   |                           |
|-----------------------------------|---------------------------|
| 1. Nozzle assembly control        | 10. Pump                  |
| 2. Scale, nozzle assembly control | 11. Return pump           |
| 3. Solenoid valve, 1              | 12. Pressure control pump |
| 4. Solenoid valve, 2              | 13. Inlet pump            |
| 5. Measuring nipple, fan pressure | 14. Ignition electrodes   |
| 6. Valve block                    | 15. Air intake            |
| 7. Burner tube                    | 16. Brake plate           |
| 8. Burner flange                  | 17. Nozzle                |
| 9. Pressure outlet pump           | 18. Contactor for motor   |
|                                   | 19. Motor                 |
|                                   | 20. Fan                   |
|                                   | 21. Scale, motor control  |



- 19. Relay box
- 20. Ignition transformer
- 21. Fan wheel
- 22. Damper motor
- 23. Switch 0-I
- 24. Indicator, min. load
- 25. Switch I-II
- 26. Indicator lamp, maximum load
- 27. Inspection glass
- 28. 4-pole Euro plug (max. load)

- 29. 7-pole Euro plug (min. load feed)
- 30. Air damper
- 31. Air intake
- 32. Capacitor
- 33. Motor
- 34. Fan housing

## 3. INSTALLATION

### 3.1 Acceptance inspection

Make sure everything is delivered and the goods have not been damaged during transit. If something is wrong with the delivery, report it to the supplier. Transport damage must be reported to the shipping company.

### 3.2 Preparations for installation

Check that the burner's dimensions and capacity range are suitable for the boiler in question. The power data on the type sign refers to the burner's min. and max. power.

### 3.3 Distribution of oil

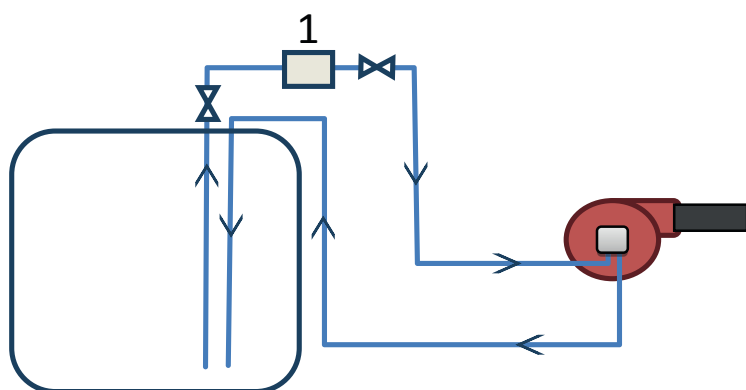
In order to achieve good reliability, it is important that the oil distribution system is designed correctly.

Take the following into account:

- Selection of pipe diameter, pipe length and height difference; see Pump instruction.
- Pipelines are to be laid with a minimal number of glands.
- The pipes are to be laid so that the oil supply hoses are not subjected to tensile stresses or are excessively bent when the burner is swung out or removed for service.
- The oil filter should be installed so that the filter cartridge can easily be replaced or cleaned.
- Oil-affected parts shall be selected in materials that are capable of withstanding the medium's physical properties.
- When installing oil hoses, check that the inlet and return hoses are fitted to the appropriate connection on the oil pump. The hoses shall be located so that they do not bend or become subject to tensile load.
- Bleed the oil system. The oil pump/oil preheater may be damaged if run dry. The vacuum should not fall below 0 bar in the suction line during start-up.

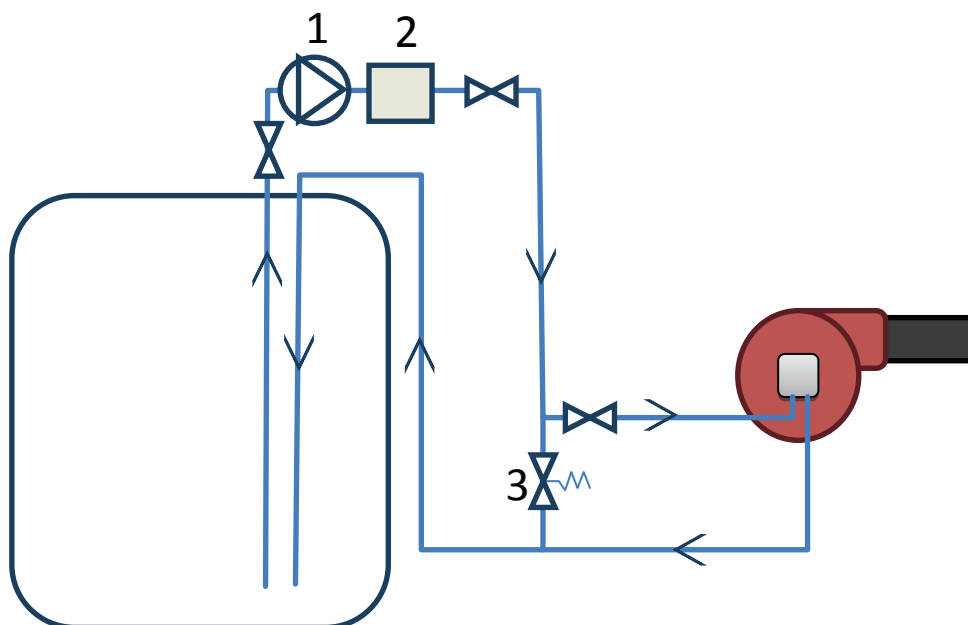
**!** Be sure to fill the burner oil system before starting it for the first time.

#### 3.3.1 Proposed pipe routing for oil distribution systems without transport pump



1. Oil filter

### 3.3.2 Proposed pipe routing for oil distribution systems with transport pump



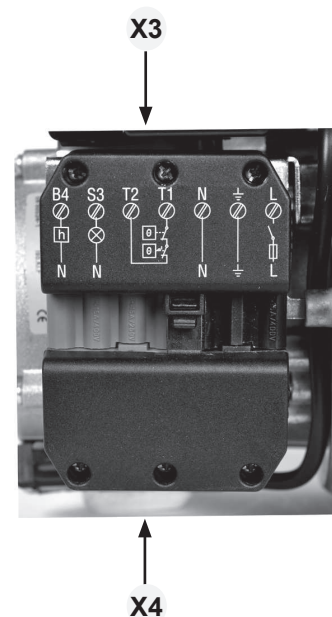
1. Transport oil filter
2. Oil filter
3. Overflow valve 0.5 – 2.0 bar

## 3.4 Electrical connection

Before electrical installation begins, the main power switch must be turned off.

If the boiler has a 7-pole, they will usually connect directly to the burner. Otherwise, use the supplied connectors. See connection under Electrical equipment.

1. Switch off the main switch.
2. Connect the Euro plugs. (See Electrical equipment)
3. Make sure the burner operations switch (S1) is off.
4. Turn on the main switch.



If any electrical connection is used other than that recommended by Bentone, there may be a danger of damage to property and personal injury.

## 3.5 Nozzle selection

See under Technical data: Recommended nozzle and Nozzle table.

If, after selecting the nozzle, burner type B45-2 has difficulty starting, this may in some cases be due to the selection of nozzle made for the first stage. Selecting a nozzle with a smaller effect in the first stage may solve the problem.

## 3.6 Setting of brake plate and air flow

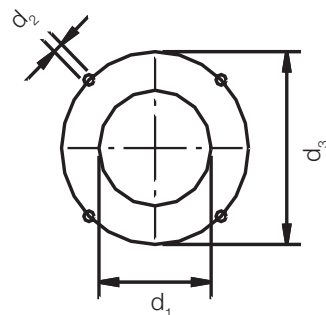
Prior to commissioning, the basic settings of the burner can be set in accordance with the diagram. See under Basic settings. Note that it is simply a matter of a basic setting that should be adjusted retrospectively once the burner has started. You should then conduct a flue gas analysis and soot quantity measurement.

## 3.7 Burner installation

### 3.7.1 Hole pattern

Make sure the hole pattern on the boiler is designed for burner flange.

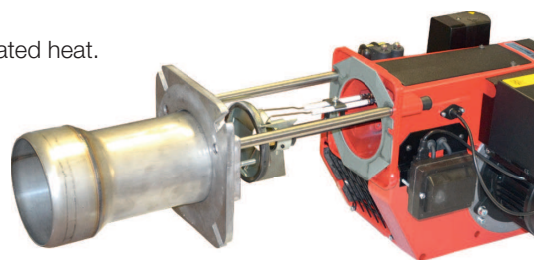
Combustion device	$d_1$	$d_2$	$d_3$
B45-2	Ø 135-(175) 200	M10-M12	Ø (195) 224-260





### 3.8 Burner installation

1. Separate the burner body and the flange.
2. Remove the brake plate from the oil pipe.
3. Install the selected nozzle. (See Technical data)
4. Install the brake plate on the oil pipe
5. Remove the burner tube from the flange.
6. Install the flange with gasket on the boiler.
7. Install the burner tube on the flange. Make sure that the hole in the front of the burner tube pipe is pointing down. This allows any drops of oil to flow out.
8. Insulate between the burner and boiler door to reduce radiated heat.
9. Slide the burner body on the guides.
10. Lock the burner body using with the nut/nuts.
11. Connect the oil hoses to the pump.
12. Connect burner electrically.

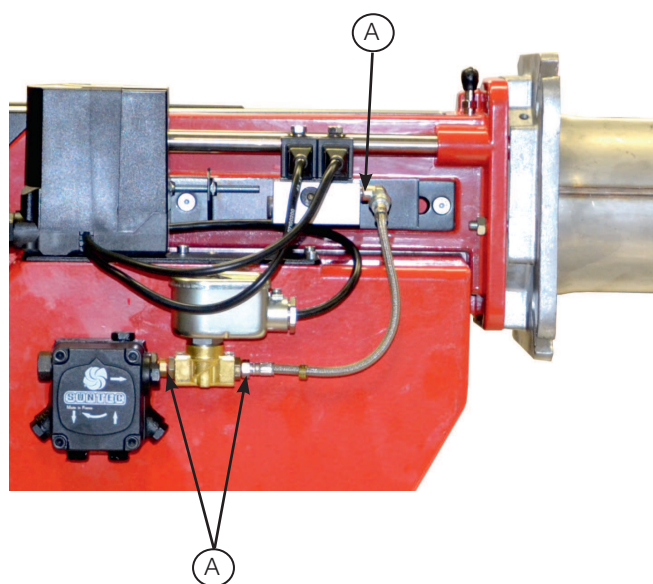


**!** If the burner tube must be installed from the inside the boiler, it must be possible to open the boiler or have a hinged flange that is designed so that it can be reconnected with the burner tube installed.

### 3.9 Check oil line seals

Once the burner has been installed and commissioned, the seals of the various coupling elements should be checked (A).

When a leak is detected, it is usually sufficient to tighten the coupling element that is leaking.



**!** Recommended thread sealer.  
(Loctite 5188, 5400)



## 4. BASIC SETTINGS

### 4.1 Examples of basic setting

Burner output	Max. 500 kW
	Min. 200 kW
Estimated nozzle output min. load	200 kW/10,4 kWh/kg* = 20 kg/h
Estimated nozzle output max. load	(500kW-200 kW)/10,4 kWh/kg* = 30 kg/h

The nozzle effect is calculated for two-stage burners with two nozzles (separately for each nozzle).

Nozzle selection in accordance with the table. (See technical data)

Nozzle selection is based on the selected pump pressure and the desired effect.

According to the nozzle table, this provides the following nozzle.

Selected pump pressure	25 bar
Nozzle min. load	3.50 gph
Nozzle max. load	5.00 gph
Power in min. load	20.61 kg/h => 20.61 kg/h x 10 kWh/kg* = 206 kW
Power in max. load	20.61 kg/h + 29.44 kg/h => 50.05 kg/h x 10 kWh/kg* = 501 kW

\* ≈10,4 kwh/kg

#### Basic settings

The setting value for maximum load 500 kW and minimum load 200 kW according to the basic settings tables. For the correct procedure when implementing settings, see 4.2 Nozzle assembly control, brake plate B45-2 and 4.3 Air setting B45-2

Damper motor 2-stage (see technical data ...)

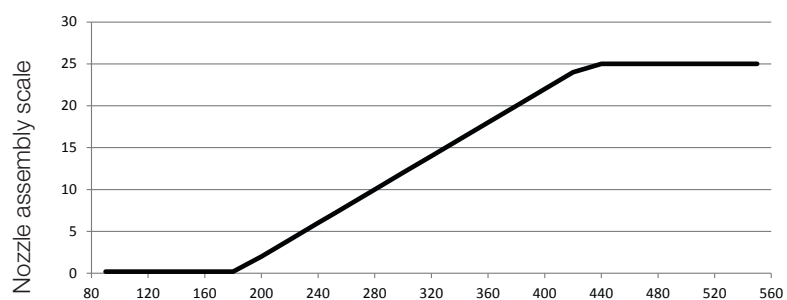
Effects and nozzle selection from example

Nozzle assembly	Stage 2 = 25	
Damper motor	Closed = 0°	Blue cam
	Min. load = 45°	Orange cam
	MV max. load = 60°	Black cam
	Max. load = 90°	Red cam

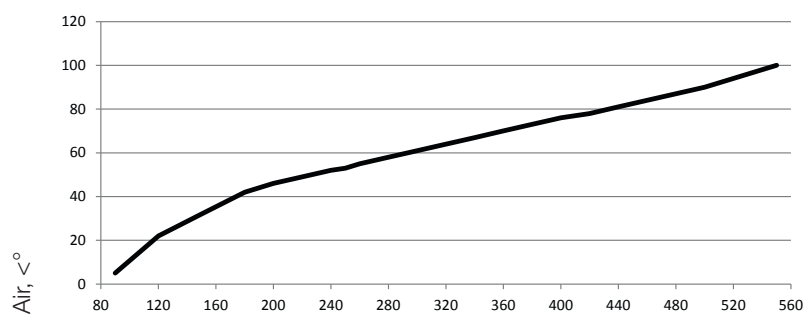
Black cam for MV (solenoid valve) max. load shall be placed between the cams for min. and max. load. The positions of MV max. load are determined by the boiler's characteristics when switching between stages. By default, the black cam is placed between the orange and red cams.

Basic settings should only be seen as setting values to get burner to start and establish a flame. Once the burner has started and established a flame, it will be necessary to adjust the settings so that they are adapted to the installation in question and the fuel used at the time.

## 4.2 Setting values for nozzle assembly B45-2 RME



## 4.3 Setting values for air damper B45-2 RME



## 4.4 Nozzle assembly control, brake plate

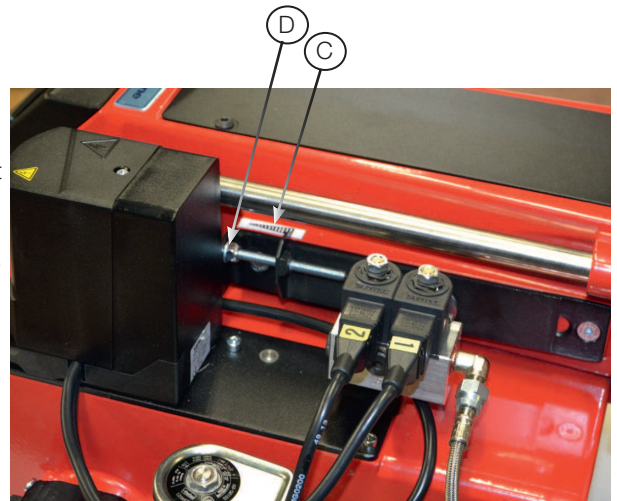
The nozzle assembly control is used to achieve the most favourable pressure drop across the brake plate as possible in the various power stages.

### 2 nozzles

The nozzle assembly control is manually adjusted in order to achieve optimal pressure loss for good combustion. Brake plate position is controlled primarily by the second stage effect.

Set the desired position on the scale (C) using the set screw (D) (left turn reduces pressure loss, the brake plate is moved outward).

If pulsation occurs, the changed pressure drop over the brake plate may result in the pulsation stopping



## 4.5 Air setting Damper motor

The damper motor turns the damper between three pre-set positions. These positions are controlled in the motor by a microswitch, whose switching modes is set using the colour-coded cams. There is also a black cam that controls the engagement of solenoid valve 2 second stage oil.

When the amount of air needs to be changed:

Remove the hood from the damper motor and change the position of the cams by turning them using the included tool. In order for the cam to be inoperative while being turned, we recommend that you switch to a different stage than the one that is to be adjusted and, after making the change, returning to pre-check of the outcome.

### Adjustment Stage 1

Set the operations switch to Stage 2 (II).

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

Once the red or orange cam has been moved, check whether the black cam must be changed. The black cam must be between the orange and red cam.

Return the operations switch to Stage 1 and check combustion.

### Adjustment Stage 2

Set the operations switch to Stage 1 (I).

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

Once the red or orange cam has been moved, check whether the black cam must be changed. The black cam must be between the orange and red cam.

Return the operations switch to Stage 2 and check combustion.

### Closed

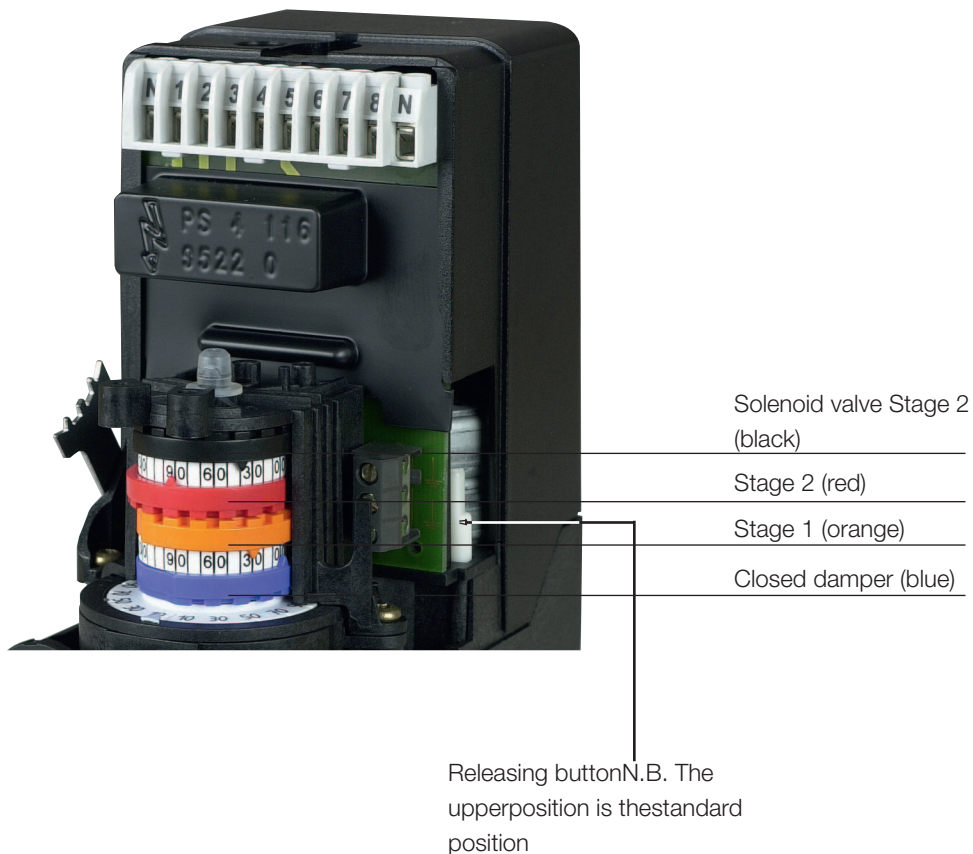
The blue cam is the limit position for fully closed damper and does not normally need to be changed.

### Disconnection

Damper motor can be disengaged using the white disconnection button.  
This function facilitates the replacement of damper motor.

During disconnection. Press the white disconnection button and move it outwards until it engaged in a milled groove.

During connection. Slide the white release button inwards and release. Changing the position of the motor until the gears engage with each other.

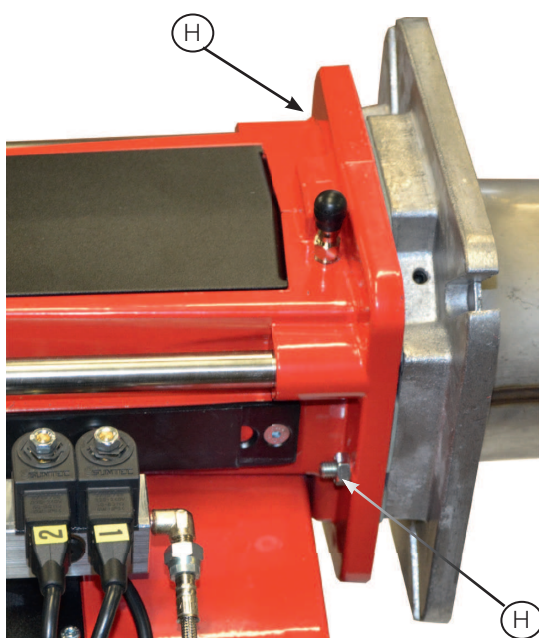


## 5. BURNER SERVICING

### 5.1 Servicing the combustion assembly

#### Removal and installation

1. Break the main current and disconnect the Euro plugs from the burner.
2. Loosen the nuts (H) and pull the burner backwards.
3. Remove the brake plate from the oil pipe and clean the brake plate.
4. Unscrew the nozzles.
5. Install new nozzles.
6. Install the brake plate (See Brake plate setting). (see technical data)
7. Check the ignition electrodes (See Setting the ignition electrodes). (see technical data)
8. If necessary, replace the ignition electrodes.
9. Press the burner together and lock using the nuts (H).
10. Open the boiler/hinged flange to access the burner tube if necessary.
11. Remove and clean the burner tube.
12. Install the burner; make sure you install the drainage hole in the burner tube so that any spilled oil can drain out.
13. Close the boiler/hinged flange.
14. Fit the Euro plugs and turn on the main current.
15. Check combustion \*.



#### Note:

- \* When servicing/replacing components that affect combustion, an analysis and soot test shall be carried out on the installation.

**!** Service should be performed after approx. 3,000 working hours, but no less than once a year.

**!** Use caution when operating the burner, surfaces may be hot.

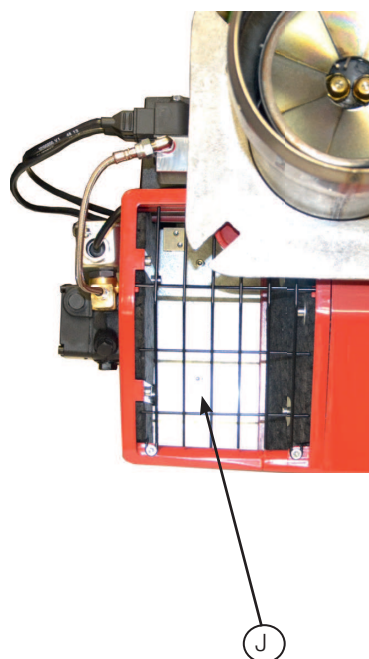
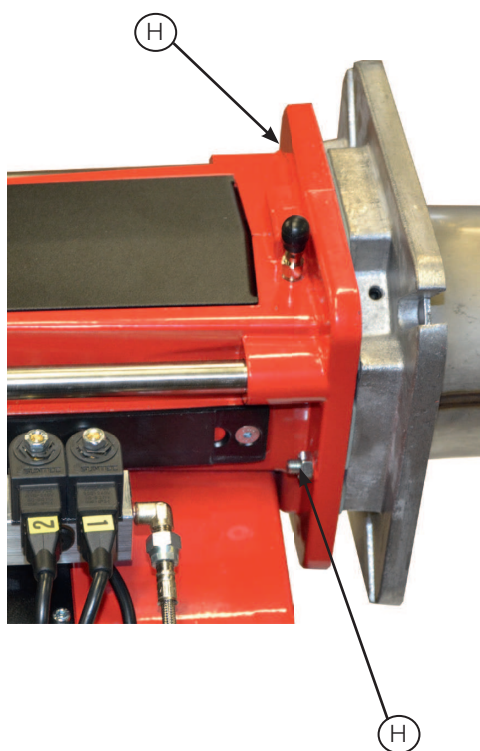
**!** If the burner tube must be installed from the inside the boiler, it must be possible to open the boiler or have a spectacle flange that is designed so that it can be reconnected with the burner tube installed.

**!** NB: When soiled, always replace nozzles with new nozzles. Do not clean.

## 5.2 Servicing air dampers

### Removal and installation

1. Break the main current and disconnect the Euro plugs from the burner.
2. Loosen the nuts (H) and pull the burner backwards.
3. Remove the intake grille at the air intake.
4. Disconnect the damper motor.
5. Clean the air damper (J) and the intake. Lubricate any damper shaft.
6. Reconnect the damper motor.
7. Install the intake grille for the air intake.
8. Press the burner together and lock using the nuts (H).
9. Fit the Euro plugs and turn on the main current.
10. Check combustion \*.



### Note:

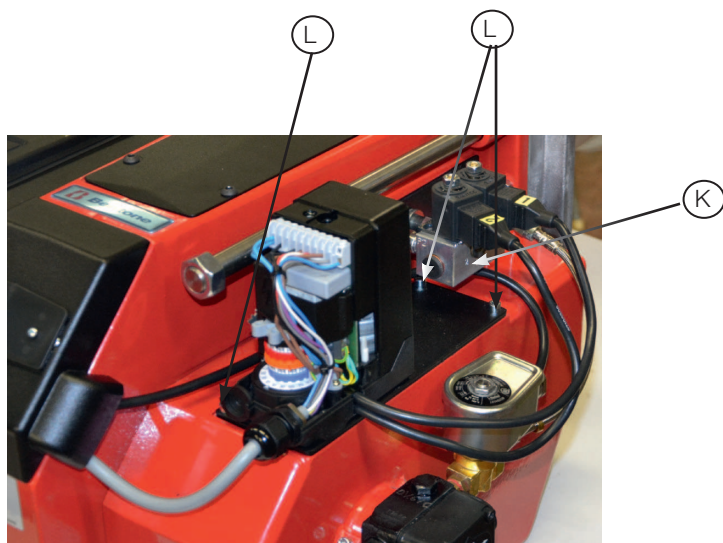
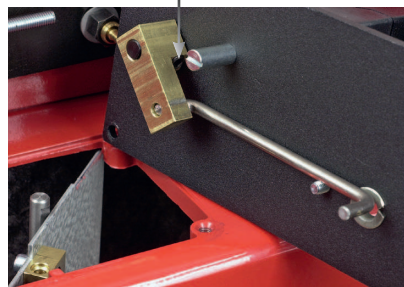
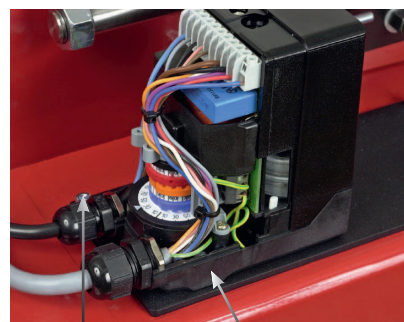
- \* When servicing/replacing components that affect combustion, an analysis and soot test shall be carried out on the installation.



## 5.3 Replacement of damper motor

### Removal and installation

1. Break the main current and disconnect the Euro plugs from the burner.
2. Note the position of the cables and loosen the wires in the damper motor.
3. Disengage the damper motor and lock it at 30°.
4. Loosen the screws (L) to the damper motor mounting plate. Some of the screws may be difficult to access. The valve block (K) may be loosened in order to make this easier. Observe caution when removing and installing valve block and ensure that a seal has been achieved when reinstalling.
5. Lift the damper motor carefully so that the air damper remains in the air intake. Remove (M) the control arm from the motor shaft.
6. Remove the damper motor from the mounting plate (N).
7. Reinstall the damper motor on the mounting plate.
8. Fit the control arm (m) on the damper motor shaft. It is important that the screw is perpendicular to the plane of the shaft.
9. Disengage the damper motor and lock it at 30°.
10. Install the mounting plate by guiding the control arm into the bracket on the air damper and the air damper shaft in the mounting plate (make sure the bushings between the mounting plate and the damper shaft are in place).
11. Disengage the damper motor, feel that the damper moves easily. Close the damper and reset the protractor on the damper motor.
12. Connect the damper motor electrically.
13. Set the damper motor notches as on the motor that has been replaced.
14. Fit the Euro plugs and turn on the main current.
15. Check combustion. \*



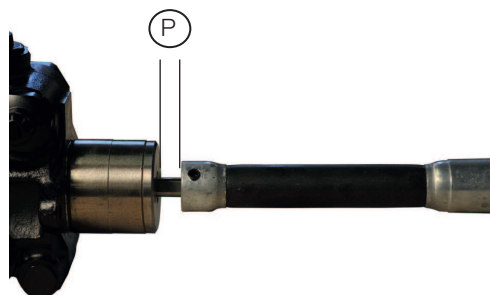
### Note:

- \* When servicing/replacing components that affect combustion, an analysis and soot test shall be carried out on the installation.

## 5.4 Replacement of oil pump

### Removal and installation

1. Break the main current and disconnect the Euro plugs from the burner.
2. Undo the oil lines from the pump.
3. Loosen the screws (O) and pull out the oil pump
4. Move the pump coupling to the new pump and set the same distance between (P) the pump and the pump coupling as before in order to avoid pressure on the pump seal.
5. Install the oil pump on the burner and tighten the screws (O). (It is important that the pump shaft splines align correctly in the pump coupling).
6. Fit the oil lines.
7. Fit the Euro plugs and turn on the main current.
8. Bleed the pump, start the burner and set the correct oil pressure.
9. Check combustion. \*



Use caution when operating the burner, surfaces may be hot.



When servicing oil bearing components, check for oil leakage when the burner is commissioned after servicing.

### Note:

- \* When servicing/replacing components that affect combustion, an analysis and soot test shall be carried out on the installation.



## 6. PUMP INSTRUCTION

### 6.1 Suntec DV67C

#### 6.1.1 Technical data

Viscosity range:	2.0 to 75.0 mm <sup>2</sup> /s
Pressure range:	8-28 bar
Oil temperature:	0 to +90°C

### 6.2 Components

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

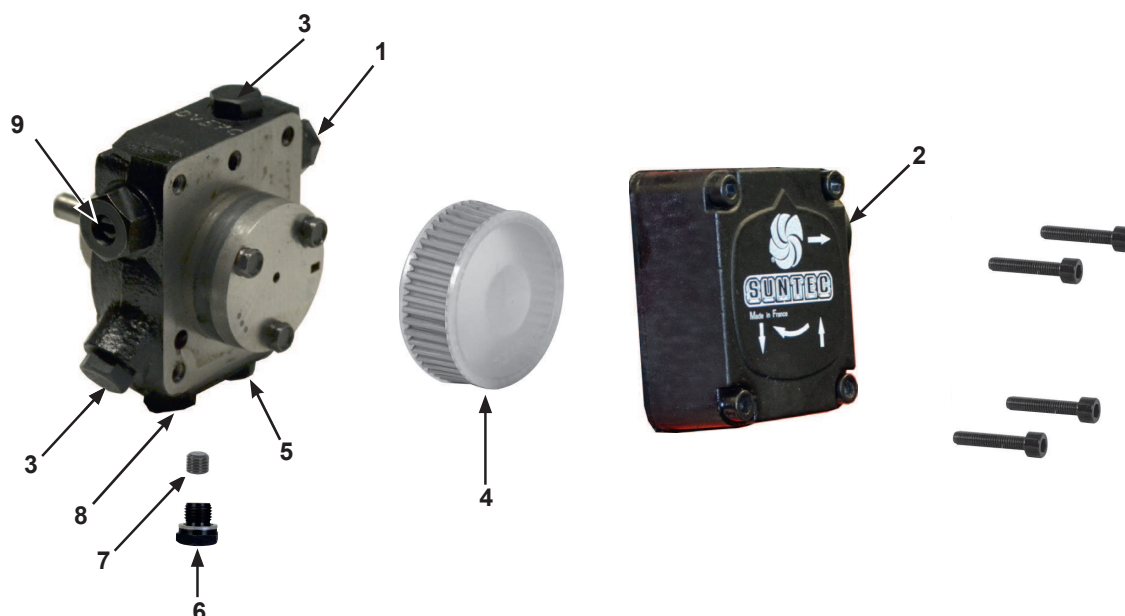
### 6.2.1 Filter replacement

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.



### 6.2.2 One-pipe system

Conversion to one-pipe system

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

### 6.2.3 Two-pipe system

Conversion to two-pipe system

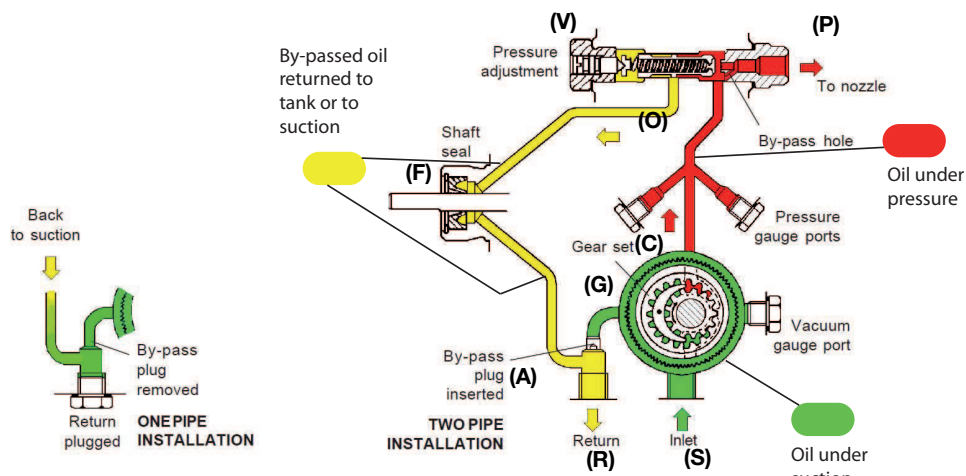
Remove the metal plug (7) G 1/4", fit the return plug (8) in the return line (9).

Return plug are not included in products with one-pipe system, separately sold.

### 6.2.4 Solenoid valve



## 6.2.5 Function Suntec DV67C



### Pump working method

When the pump is started oil is drawn through the suction port "S" via filter "H" to the suction side of the gearwheel set "C". From here the gear-wheel set pumps the oil to the pressure side and at the same time the oil becomes pressurized. The oil is led to cut-off and regulating valve "V" which opens when the set pressure is reached.

The pressure is controlled and kept constant by regulating valve "V". At the same time the gearwheel set "C" distributes the oil through nozzle port "P" and pump return side "R" via the shaft seal "F".

The quantity of oil supplied to nozzle port "P" is determined by the pressure set on regulating valve "V" and the nozzle/resistance in the nozzle line.

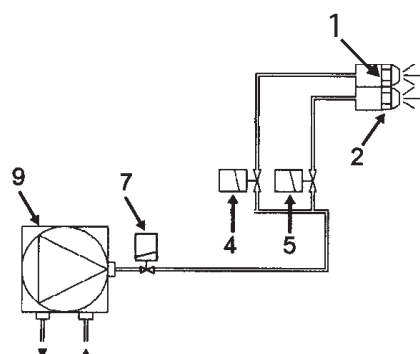
In 2-pipe-systems excess oil is led back to the oil tank. In 1-pipe-systems the by-pass plug "A" must be removed to give free flow back to the suction side via return line "G" with return port "R" closed.

If the pump is overloaded, i.e. more oil is demanded than the gearwheel is able to pump under the given conditions, the oil pressure falls below the set value because the piston of the regulating valve moves towards its closed position and partially or wholly cuts off the return oil via port "O".

This can be remedied by

- reducing the pump pressure
- reducing the capacity, i.e. smaller nozzle or greater resistance
- changing to a pump with higher capacity

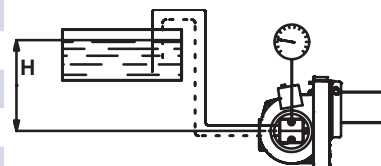
- |                            |         |      |
|----------------------------|---------|------|
| 1. Nozzle                  | Stage 1 |      |
| 2. Nozzle                  | Stage 2 |      |
| 4. Solenoid valve          | Stage 1 | (Y1) |
| 5. Solenoid valve          | Stage 2 | (Y2) |
| 7. Safety valve for nozzle | (Y1S)   |      |
| 9. Oil pump                |         |      |



## 6.2.6 Suction pipe tables DV67C

### 6.2.6.1 Overhead Tank

One-pipe system				Two-pipe system			
Height	Line diameters			Height	Line diameters		
M	Ø 6mm	Ø 8mm	Ø 10mm	M	Ø 8mm	Ø 10mm	Ø 12mm
m	m	m	m	m	m	m	m
4,0	45	144	150	4,0	42	108	150
3,0	39	127	150	3,0	36	94	150
2,0	34	109	150	2,0	31	81	150
1,0	28	92	150	1,0	26	68	144
0,5	26	83	150	0,5	23	61	130
0,0	23	74	150	0,0	20	54	116



The table applies to Fuel oil 1

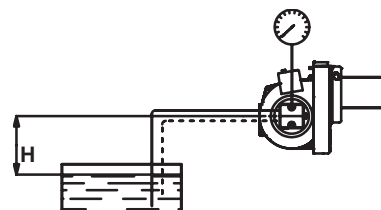
### 6.2.6.2 Underlying Tank

#### One-pipe system

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

#### Two-pipe system

Height	Line diameters		
M	Ø 8mm	Ø 10mm	Ø 12mm
m	m	m	m
0,0	20	54	116
-0,5	17	48	103
-1,0	15	41	89
-2,0	9	28	61
-3,0	4	14	33
-4,0	0	0	6



The table applies to Fuel oil 1

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.

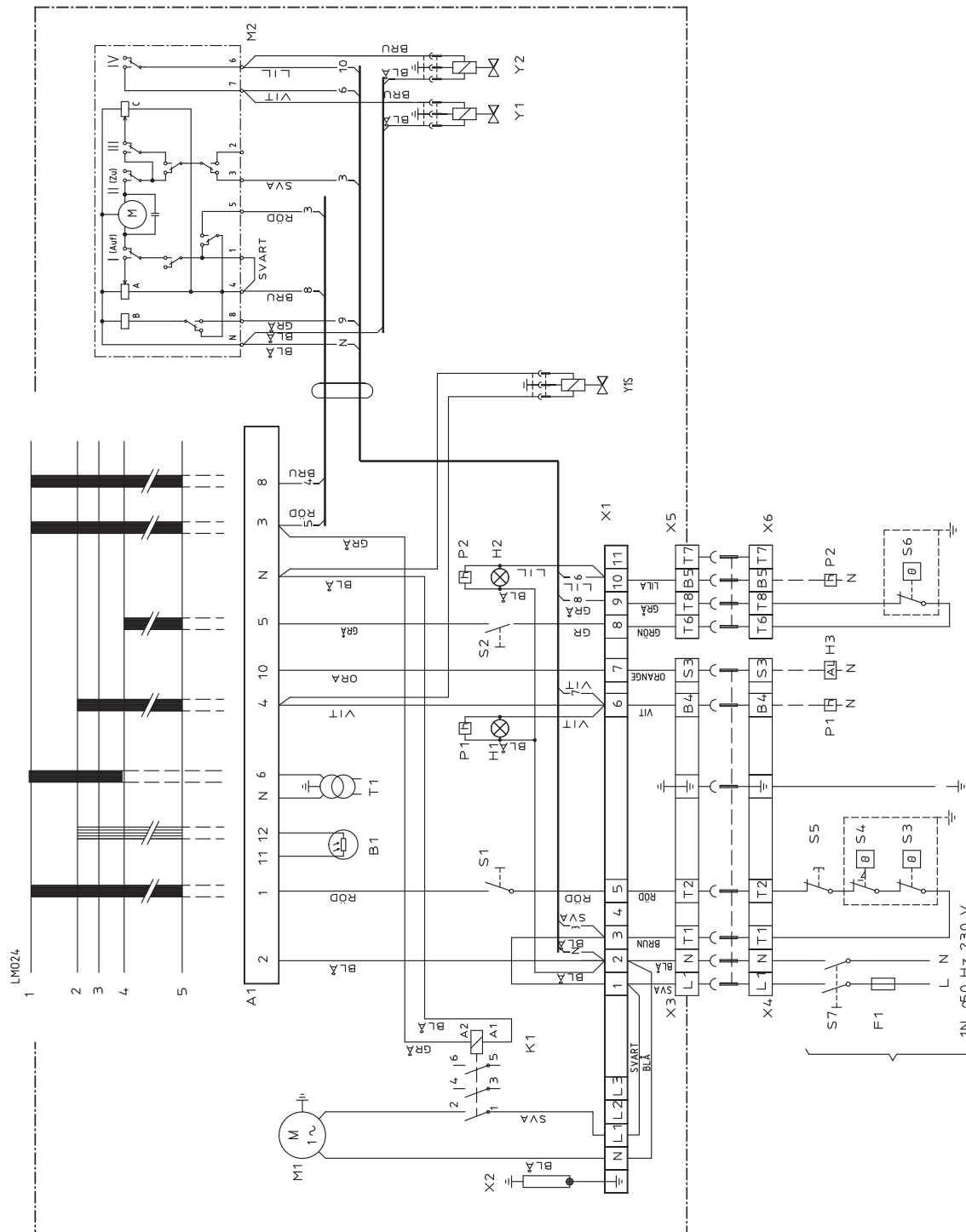
The tables apply to standard heating oil of normal grade merchantable according to existing norms. When starting operations with an empty pipe system, the pump should not be run without oil for more than 5 min.

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.



## 7. ELECTRICAL EQUIPMENT

### 7.1 Wiring diagram LMO24.255 ...



## 7.2 Component list LMO24.255 ...

A1	Burner control	S6	Control thermostat, stage 2
B1	Photoresistor	S7	Main switch
F1	Operating fuse	T1	Ignition transformer
H1	Lamp, low capacity	Y1	Gas solenoid valve 1
H2	Lamp, high capacity	Y2	Gas solenoid valve 2
H3	Alarm signal 230 V	Y1S	Safety solenoid valve
K1	Motor contactor with thermal overload protector	X1	Connection terminal board
M1	Burner motor	X2	Earth terminal
M2	Damper Motor	X3	Plug-in contact, burner
P1	Time meter, total operating time	X4	Plug-in contact, boiler
P2	Time meter, high capacity, total operating time	X5	Plug-in contact, stage 2, burner
S1	Operating switch	X6	Plug-in contact, stage 2, boiler
S2	Operating switch, stage 2		
S3	Control thermostat		
S4	Temperature limiter		Max loading K1
S5	Micro switch for hinged door		Connection A1,A2 / 95, 96 / 97, 98 Max 0,2A/15W

## 7.3 Function LMO24.255 ...

### 1 Operations switch ON, twin thermostat ON

Burner motor starts, ignition spark is formed and prevention continues until the prevention time is over and solenoid valve 1 operates (2).

### 2 Solenoid valve 1 operates

Oil mist is formed and ignited. Photoresistance indicates flame.

### 3 Safety time ends

- a If the flame goes out before this time limit is passed, the machine switches to blocking mode.
- b If the flame, for whatever reason, disappears after this time limit has passed, the burner will make a new attempt.

### 4 High load thermostat ON

The burner is in operating mode and can switch between high and low load

### 4-5 Operational status

If burner operation is interrupted by the main switch or thermostat, a new start will take place once conditions as specified in paragraph 1 are met.

### The machine blocks

Red light in the machine is on. The burner is restarted by pressing the reset button.

## 7.4 Technical data LMO24.255...

	<b>LMO24</b>
Pre-ignition time:	25 sec
Pre-ventilation time	25 sec
Reconnection after tripping	<1 sec
Ambient temperature	from - 20 to + 60 °C
Min. current at flame:	45 µ A
Max. output at dark, start:	5.5 µ A
Enclosure type	IP 40
Safety time	5 sec

### **Check of photo current**

Photo current is measured using a DC ampmeter connected in series with the photocell.

## 7.5 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

## 7.6 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

## 8. FAULT LOCATION

### 8.1 Burner will not start

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

### 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	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	

### 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

# 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





# 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 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.

## 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.

Installed by:

.....

Tel: .....





