CR00349 178 144 56-3 2021-08-04

Installation- and maintenance instruction

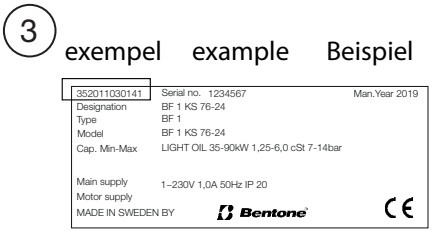
B 45 A2.2R

LMO24.255C2E

RSA 60

Translation of the original instructions.

Bentone®



-sv

1. Manualer på övriga språk

2. www.bentone.com\
nedladdning
eller scanna QR-koden.

3. Skriv in brännarens artikelnummer som finns på din typskylt (se bild) och välj ditt språk.

Detaljerad ecodesign information kan laddas ner på:
www.bentone.com/ecodesign.

-en

1. Manuals in other languages

2. www.bentone.com\download or scan QR-code.

3. Enter the burner`s article number on your data plate (see picture) and select language.

Detailed ecodesign information can be downloaded at:
www.bentone.com/ecodesign.

-da

1. Manualer på andre sprog

2. www.bentone.com\download eller scan QR-koden.

3. Indtast brænderens artikelnummer, der findes på typeskiltet (se billede), og vælg dit sprog.

Detaljerede oplysninger om ecodesign kan downloades på:
www.bentone.com/ecodesign.

-fr

1. Manuels dans d'autres langues

2. www.bentone.com\download ou scannez le code QR.

3. Saisir le numéro d'article du brûleur sur votre plaque signalétique (consultez l'illustration) et sélectionnez la langue.

Des informations détaillées sur l'écodesign peuvent être téléchargées à l'adresse:
www.bentone.com/ecodesign.

-de

1. Gebrauchsanweisungen in anderen Sprachen

2. www.bentone.com\download oder scannen Sie den QR-Code.

3. Geben Sie die Artikelnummer des Brenners auf Ihrem Typenschild ein, (siehe Bild) und wählen Sie die Sprache aus.

Detaillierte Informationen zum Ecodesign können unter www.bentone.com/ecodesign heruntergeladen werden.

Table of contents

1. Safety Information

This Installation and Maintenance manual:

- is to be regarded as part of the burner and must always be kept near the installation site.
- is intended for use by authorised personnel.
- must be read prior to installation.
- must be observed by all who work with the burner and associated system components.
- work with the burner may only be carried out by certified installers/ personnel.
- Enertech AB is not liable for any typographical errors and reserves the right to make design changes without prior notice.
- The burner may only be used for its intended purpose in accordance with the product's technical data.
- The burner may only be installed and operated by authorised personnel.
- The product is packaged to prevent damage from occurring during handling. Handle the product with care. Lifting equipment must be used to lift larger packages.
- The products must be transported/stored on a level surface in a dry environment, max. 80% relative humidity, no condensation. Temperature -20 to +60 °C.
- Check that the burner is compatible with the boiler's output range.
- The label information on the rating plate refers to the burner's minimum and maximum power.
- The power data on the type sign refers to the burner's min. and max. power.
- All components must be installed without being bent, twisted or subjected to mechanical or thermal forces which can affect the components.
- The burner must be installed so that it complies with local regulations for fire safety, electrical safety, and fuel distribution.
- Make sure when installing the equipment that there is enough space to service the burner.
- Permitted ambient temperature during operation -0 to +60 °C. Max 80% relative humidity, no condensation.
- The installer must ensure that the room has adequate air supply.
- The room must comply with local regulations pertaining to its intended use.
- The installation site must be free of chemicals.
- Burner pipes, fan wheels and air dampers may contain sharp edges.
- The surface temperature of the burner's components can exceed 60 °C.
- Caution: The burner has moving parts, and there is risk of crushing injuries.

165 105 01

- The electrical installation must be professionally carried out in accordance with applicable high voltage regulations, as per Enertech's recommendations.
- Before servicing, shut off the fuel supply and turn off the power to the burner.
- Leak checks must be performed during installation and servicing to prevent fuel leakage.
- Care should be taken by the installer to ensure that no electrical cables or fuel lines are crushed or otherwise damaged during installation or servicing.
- If the boiler is equipped with an access hatch, this must be equipped with a hatch opening switch connected to the burner's safety system.
- When in operation, the burner's noise level can exceed 85 dBA. Use hearing protection.
- The burner must not be put into operation without proper safety and protection devices.
- A Class BE fire extinguisher is recommended.
- It is forbidden to alter the design or use accessories which have not been approved by Enertech in writing.
- Prior to operation, the following points must be checked:
- fitting and installation work has been completed and approved.
- electrical installation has been correctly performed.
- flue gas ducts and combustion air ducts are not blocked.
- all actuators and control and safety devices are in working order and correctly set.
- After commissioning, if a steady red light on the burner control is displayed, contact your installation technician.

Burner servicing schedule

Servicing must be carried out once a year or after 3000 hours of operation.

Burner	1 year	3000 hrs
Filter	1 year	3000 hrs Change
Oilhose	1 year Control/change	
Nozzle	1 year Change	3000 hrs Change
Electrods	1 year Change/cleaning	3000 hrs Change/cleaning
Brake plate	1 year Change/cleaning	3000 hrs Change/cleaning
Motor	1 year	3000 hrs
Cuppling chaft	1 year Control/change	3000 hrs Control/change
Fan wheel	“1 year Change when dirty / unbalance”	“3000 hrs Change when dirty / unbalance”
Oil filter	1 year	3000 hrs Change
Oil valve	Tightness check 1 year	Replacement in case of leakage

Component replacement intervals

Components	Service life – Recommended replacement	Service life – Recommended replacement Operating cycles
Control system	10 years	250 000 cycles
Pressure switch	10 years	250 000 cycles
Flame guard	10 years	250 000 cycles
UV flame sensor	10 000 hrs	N/A
Damper motor		500 000 cycles
Contaktor	10 years	500 000 cycles

The burner and its components must be recycled according to applicable regulations.

Delivery check

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

2. Technical data

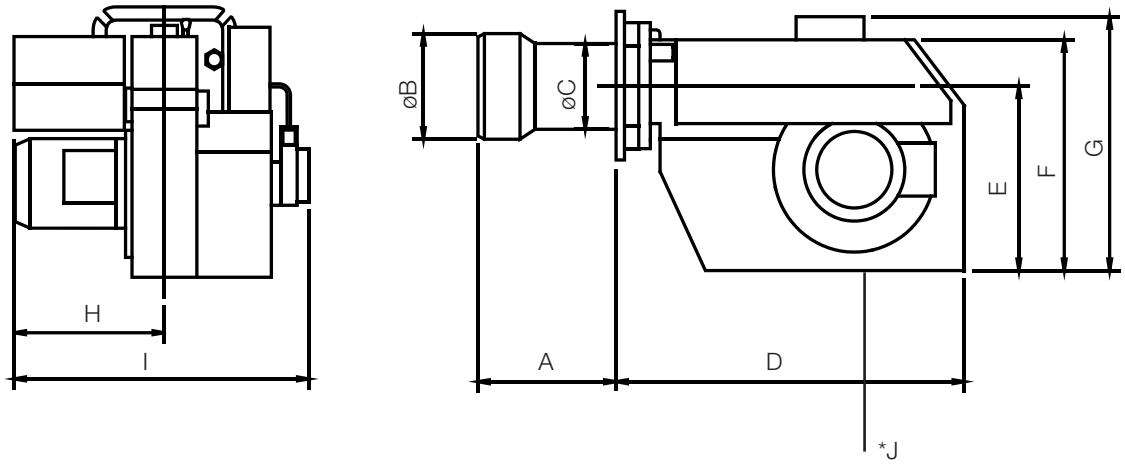
The burner is intended for:

- Light oil, B10 heating oil/biofuel blend (as defined in DIN V51603-6).

and is used for:

- Water heating generators
- Hot air generators (these require LMO 24 255 C2E)

2.1 Dimensions B 45 A2.2R



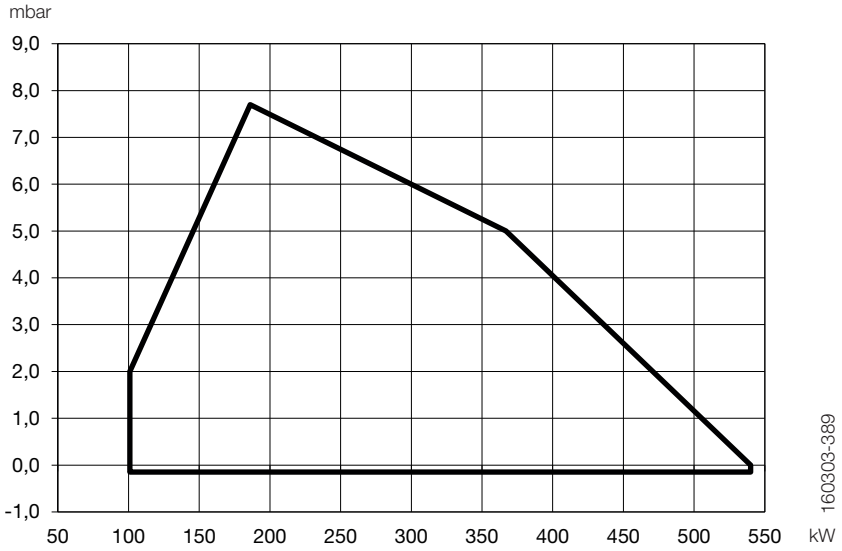
	A	Ø B	Ø C	D	E	F	G	H	I	*J
B 45	240/340	159	134	480	252	328	335	262	515	200

* Min. recommended distance to floor.

165 305 37-2

2.2 Working field B 45 A2.2R

8.5-45.5 kg/h
101-540 kW



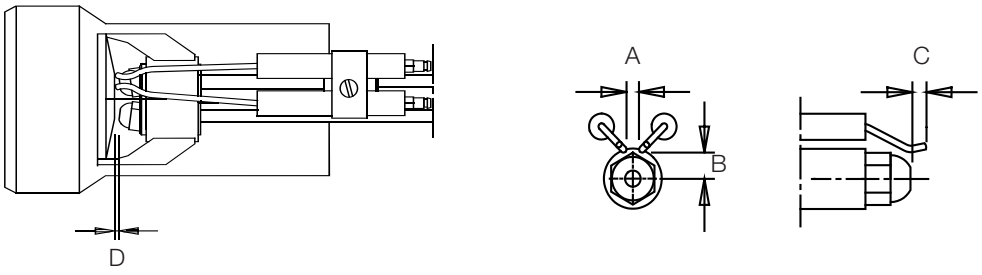
2.3 Electric Specification

Burner correspond to IP 20

Type	Motor	Complete burner	Sound
B 45	450W 230V 50/60Hz 10µF	230V 4,63 A 50Hz	84 dBA ± 0,5 dBA

Max operating current, see data plate.

2.4 Setting of brake plate and air flow



	a	b	c	d
B 45	3,5-4,0	7,0-9,0	2,0-3,0	5,0-6,0

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

2.5 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.

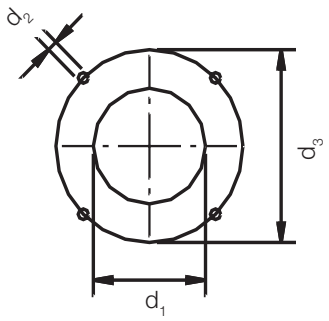
Nozzle:	45° Solid/semisolid
	60° Solid/semisolid
	80° Solid/semisolid
Pump pressure	14 bar (8-25 bar) **depending on pump model**

2.6 Burner installation

2.6.1 Hole patten

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

Combustion device	d_1	d_2	d_3
B 45	ø (135) 165	M14	ø (200) 224-270



2.7 Nozzle table

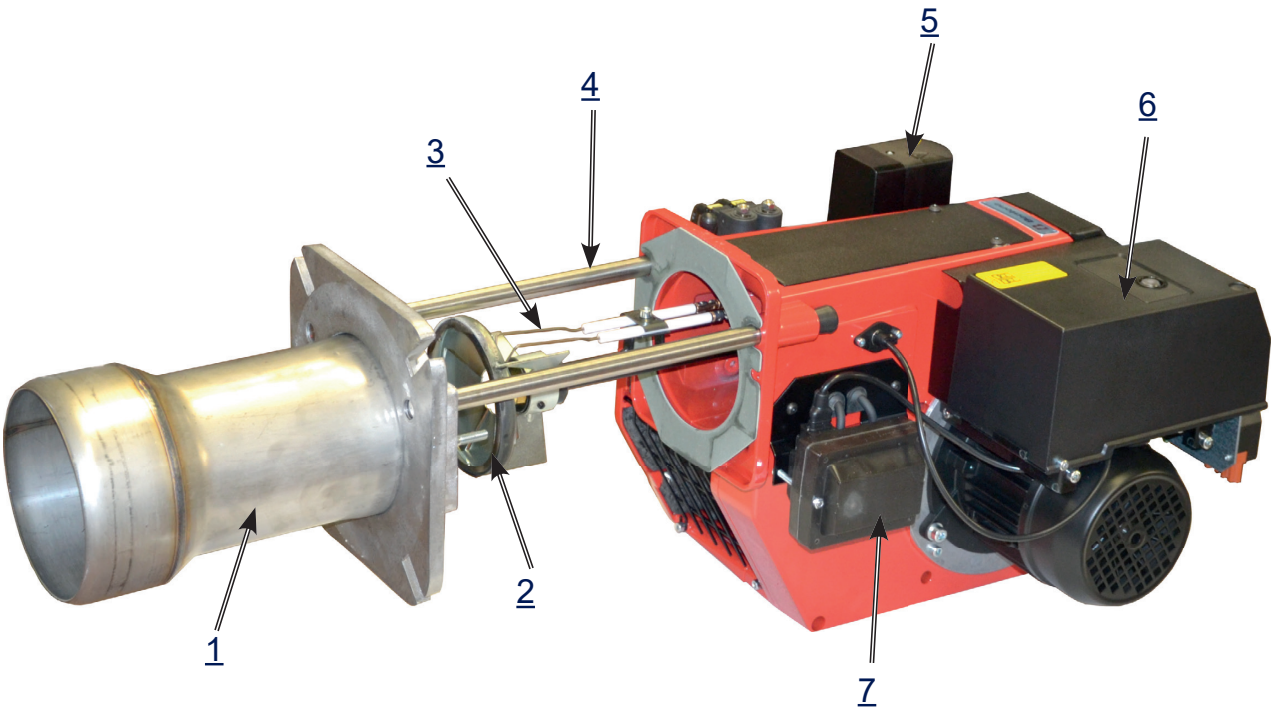
Pump pressure bar	10			11			12			13		
Gph	kg/h	kW	Mcal/h	kg/h	kW	Mcal/h	kg/h	kW	Mcal/h	kg/h	kW	Mcal/h
1,00	3,72	44	38	3,90	46	40	4,08	48	42	4,24	50	43
1,10	4,09	48	42	4,29	51	44	4,48	53	46	4,67	55	48
1,20	4,47	53	46	4,68	55	48	4,89	58	50	5,09	60	52
1,25	4,65	55	47	4,88	58	50	5,10	60	52	5,30	63	54
1,35	5,02	59	51	5,27	62	54	5,50	65	56	5,73	68	58
1,50	5,58	66	57	5,85	69	60	6,11	72	62	6,36	75	65
1,65	6,14	73	63	6,44	76	66	6,73	80	69	7,00	83	71
1,75	6,51	77	66	6,83	81	70	7,14	85	73	7,42	88	76
2,00	7,45	88	76	7,81	93	80	8,16	97	83	8,49	101	87
2,25	8,38	99	85	8,78	104	90	9,18	109	94	9,55	113	97
2,50	9,31	110	95	9,76	116	100	10,19	121	104	10,61	126	108
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	24,46	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	63,71	435	374	38,19	453	389
9,50	35,37	419	361	37,09	440	378	38,74	549	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
22,00	81,91	971	835	85,89	1019	876	89,73	1064	915	93,36	1107	952
24,00	89,36	1060	911	93,70	1111	956	97,88	1161	998	101,85	1208	1039
26,00	96,81	1148	987	101,50	1204	1035	106,04	1258	1081	110,33	1308	1168

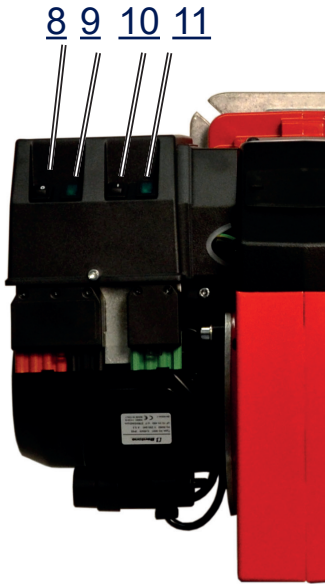
The table applies to oil with a viscosity of 4.4 mm ^{2}/s at a density of 830 kg/m ^{3}.

Pump pressure bar	14			15			16			17		
Gph	kg/h	kW	Mcal/h	kg/h	kW	Mcal/h	kg/h	kW	Mcal/h	kg/h	kW	Mcal/h
1,00	4,40	52	45	4,56	54	46	4,71	56	48	4,85	57	49
1,10	4,84	57	49	5,01	59	51	5,18	61	53	5,34	63	54
1,20	5,29	63	54	5,47	65	56	5,65	67	58	5,82	69	59
1,25	5,51	65	56	5,70	68	58	5,89	70	60	6,07	72	62
1,35	5,95	70	61	6,15	73	63	6,36	75	65	6,55	78	67
1,50	6,60	78	67	6,83	81	70	7,06	84	72	7,27	86	74
1,65	7,27	86	74	7,52	89	77	7,77	92	79	8,01	95	82
1,75	7,71	91	79	7,97	95	81	8,24	98	84	8,49	101	87
2,00	8,81	104	90	9,12	108	93	9,42	112	96	9,71	115	99
2,25	9,91	118	101	10,26	122	105	10,60	126	108	10,92	130	111
2,50	11,01	131	112	11,39	135	116	11,77	140	120	12,13	144	124
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	374
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
22,00	96,92	1149	988	100	1189	1023	104	1229	1057	107	1267	1089
24,00	106	1254	1078	109	1297	1116	113	1341	1153	116	1382	1188
26,00	115	1359	1168	119	1406	1209	122	1453	1249	126	1497	1287

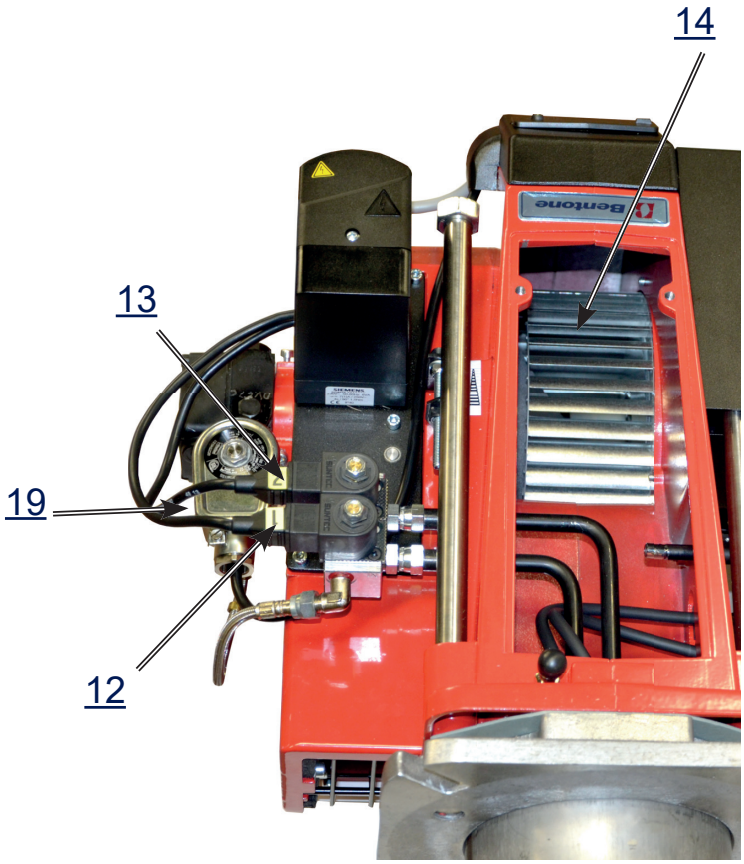
The table applies to oil with a viscosity of 4.4 mm ^{2}/s at a density of 830 kg/m ^{3}.

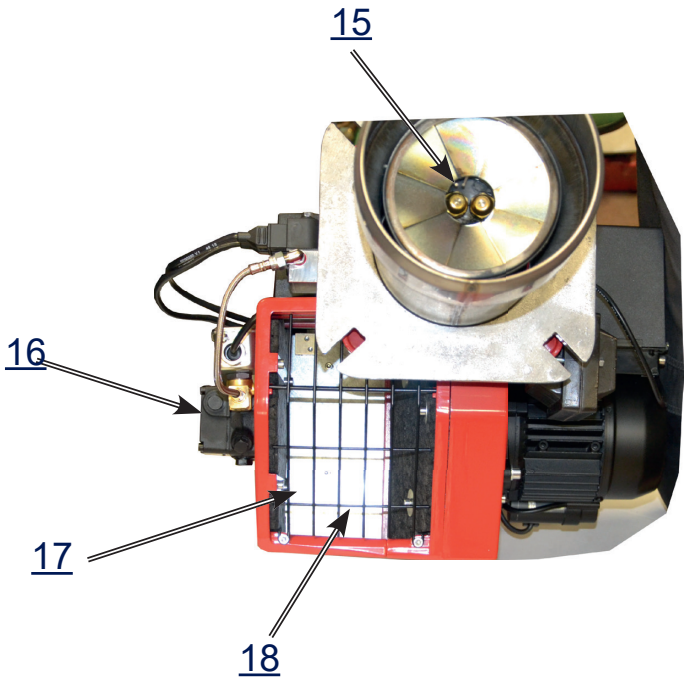
2.8 Description





1. Blast tube
2. Brake plate
3. Ignition electrodes
4. Gejder
5. Damper motor
6. Electric box
7. Ignition transformer
8. Switch I-0
9. Indicator lamp Stage 1
10. Switch I-II
11. Indicator lamp Stage 2
12. Valve Stage 1
13. Valve Stage 2
14. Fan wheel
15. Nozzle
16. Pump
17. Air intake
18. Air damper
19. Safety valve


14
13
19
12


15
16
17
18

3. General instructions

3.1 General rules

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 should be used and then in combination with a suitable oil filter before the oil pump of the burner.

If the burner is replacing an existing burner make sure that the oil filter is replaced or cleaned. The installation must only be undertaken by experienced 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.

3.1.1 Installation and maintenance instructions

The maintenance instructions supplied with the burner must be kept at an easily accessible location in the boiler room.

3.1.2 Instructions

The user must be receive detailed instructions concerning the functionality of the oil burner and entire system. It is the responsibility of the supplier to provide the user with instructions.

3.1.3 Inspection and maintenance

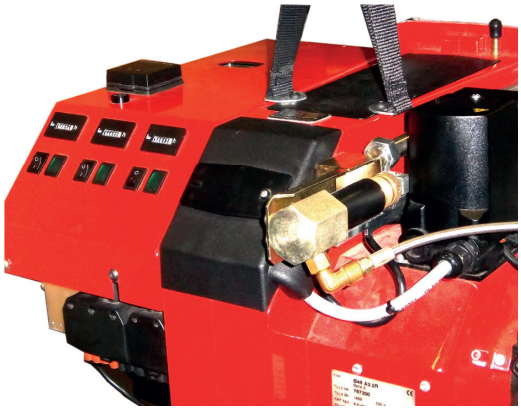
The boiler/burner should be examined regularly for any signs of malfunction or oil leakage. (See service schedule)

3.1.4 Start up

In order to obtain the correct setting, a flue gas analysis and temperature measurement must be carried out. Otherwise, there is a risk of soot build up, poor efficiency or condensation precipitation in the chimney. The system must be fine-tuned at start-up. The temperature in the chimney must be at least 60 °C at 0.5 m down in the chimney to prevent condensation.

4. Installation

4.1 Handling and lifting instruktion



The lifting aid are available as spare parts.

4.2 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.

4.3 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.

4.4 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. Self-cleaning filters are recommended for oils of a higher viscosity or oils that contain significant impurities.
- 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 0.3 bar in the suction line during start-up.

! The oil filter must be installed before the burner's oil pump.

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

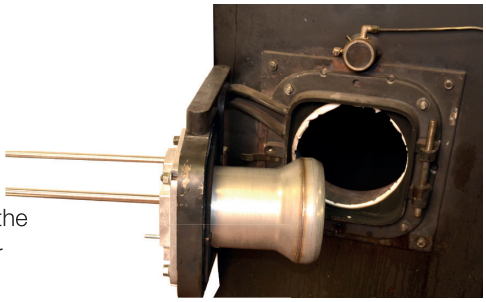
4.5 Electrical connection

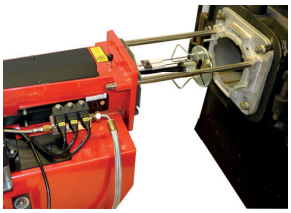
- Before work on the electrical connection, the current should be disconnected so that the installation is isolated.
- Electrical connection must be done in accordance with the applicable regulations.
- Burners should be connected to an isolator switch.
- The connection should be made in accordance with the wiring diagram.
- Fuse rating is as required.

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

4.6 Mount the burner on the boiler

1. Separate the burner body and the flange.
2. Remove the brake disc from the oil pipe.
3. Install the selected nozzle, (see Technical data).
4. Install the brake disc on the oil pipe
5. Remove the burner pipe from the flange.
6. Install the flange with gasket on the boiler.
7. Install the burner pipe on the flange. Make sure that the holes in the front edge of the burner pipe are pointing down (not on all burner pipes). This allows any drops of oil to run out.
8. Insulate between the burner and boiler door to reduce radiated heat.
9. Install the burner body on the flange.
10. Lock the burner body using with the nut/nuts.
11. Connect the oil pipes to the pump, refer to the chapter - servicing of burners.
12. Connect the burner electrically, refer to the chapter - servicing of burners.





! If the burner tube must be installed from the inside of the boiler, this means that the boiler must be opened or have a spectacle flange that is designed so that it can be reconnected with the burner tube mounted.

4.7 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.

4.8 Setting Damper motor 2-stage

Air adjustment

The damper motor rotates the air damper between three preset positions: completely closed, low load and high load. These positions are controlled in the motor by colored cam discs, the black cam disc controls the switching on/off of the solenoid valve. Adjust the amount of air by changing the position of the cam discs.

Blue cam disc is the limit position for closed air dampers and does not normally need to be changed.

Low load

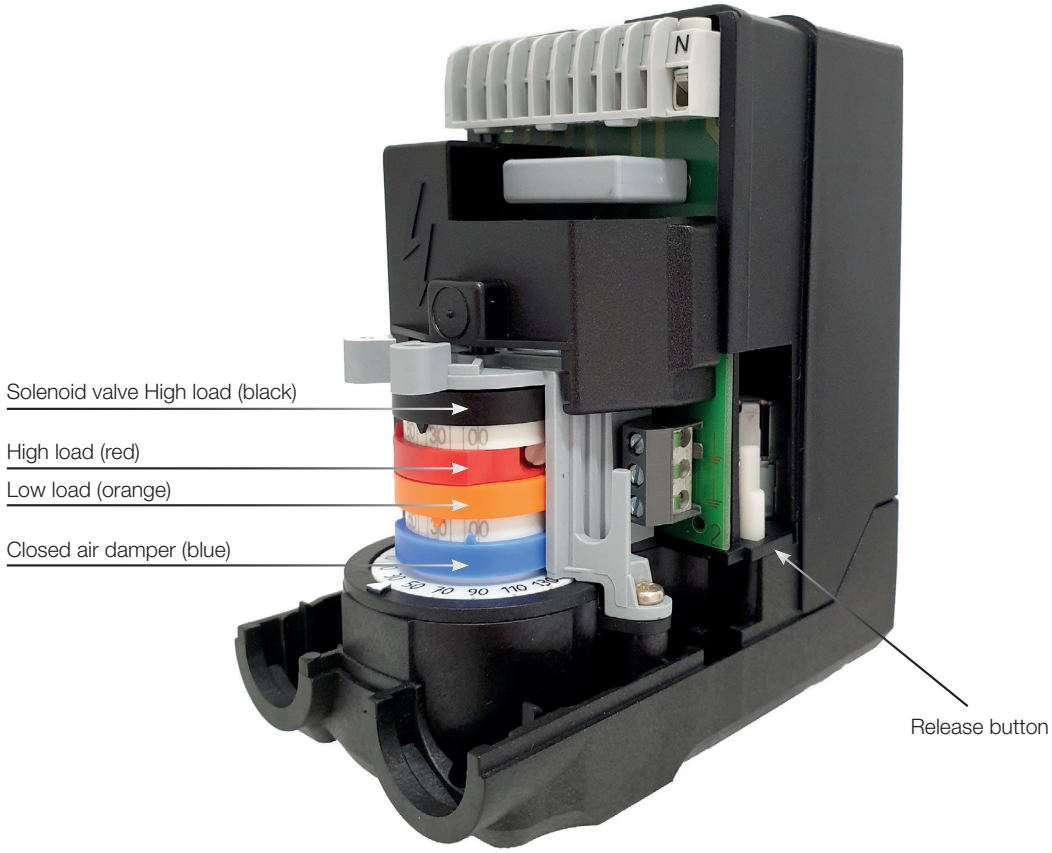
- Set control switch for load position to position II (high load).
- Turn orange cam disc to 0° to reduce airflow and to 90° to increase airflow.
- Return the control switch to position I (low load) and check the combustion values.

High load

- Set control switch for load position to position I (low load).
- Turn red cam disc to 0° to reduce airflow and to 90° to increase airflow.
- Place black cam disc in a position between red and orange cam discs and adjust to obtain a good load change.
- Return the control switch to position II (high load) and check the combustion values.

Release

By pressing the button, the motor is disengaged and the air damper can be turned. The function is used when servicing air dampers.



4.9 Examples of basic setting B 45 2.2

Burner output	400kW
Estimated nozzle output	400 kW/11,86 kWh/kg*= 33,8 kg/h

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	10,0 bar	
Nozzle	9,00 gph	9,00 gph distributed to two nozzles, e.g. 6.0 gph at stage-1 and 3,0 gph at stage-2

Basic settings

The setting value for 400 kW in accordance with basic setting tables. For the correct procedure when implementing settings, see below Nozzle assembly control, brake plate B 45-2. Air setting see below.

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.

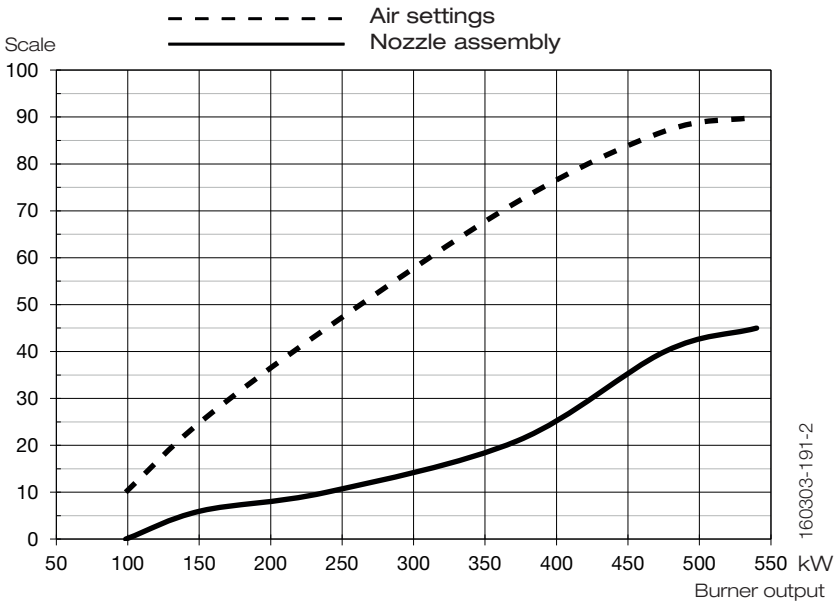
Nozzle B 45-2	
Burner output	400 kW
	400 / 11,86 = 33,8 kg/h 10bar
According to the nozzle table, this provides the following nozzle.	
Step 1	6,00 Gph = 265kW
Step 2	3,00 Gph = 132kW

Basic setting B 45-2	
The values are available in the tables for setting values of inserts or air dampers.	
Insert	400kW = 22
Low load air damper, orange	=55°
MV2 Open, black	=65°
Air damper step 2, red	=80°

These are the default settings and controlling the combustion will take place during operation.

Selection of power and connection between the different power stages must be selected and adjusted so that the system achieves good functionality.

4.10 Setting values for nozzle and air damper



Setting of brake disc 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.** A flue gas analysis and soot quantity measurement must be carried out when fine-tuning the burner.

Recomended exsess air

Grade of Oil	Excess air flue gases		Max. % CO_2
	% O_2	% CO_2 Lambda 1.2	
Light oil, B10 heating oil/ biofuel blend (as defined in DIN V51603-6)	3–5	≈12,5	15,4

5. Burner servicing

5.1 Servicing the combustion assembly

Removal and installation

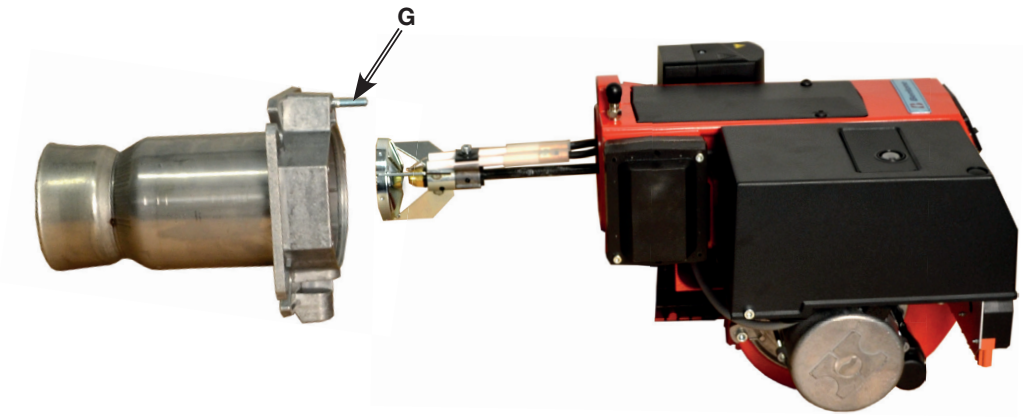
1. Switch off the main power.

> ! If the burner is directly connected, ensure that all components on the burner are without power.

2. Loosen the nut (G) and remove the burner body from the burner flange.
3. Remove the brake plate from the oil pipe and clean the brake plate.
4. Unscrew the nozzle/nozzles.
5. Install new nozzle/nozzles.
6. Install the brake plate, (see Technical data).
7. Check the ignition electrodes, (see Technical data).
8. If necessary, replace the ignition electrodes.
9. Fit the burner body and the burner flange together and secure with the nut (G).
10. Open the boiler/spectacle flange to access the burner pipe.
11. Remove and clean the burner pipe. Turn anticlockwise.
12. Install the burner pipe, make sure you install the drainage hole (not on all burner pipes) facing downwards so that any spilled oil can drain out.
13. Close the boiler / spectacle flange.
14. Turn on the main power.
15. Check combustion.

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

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



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

165 105 99

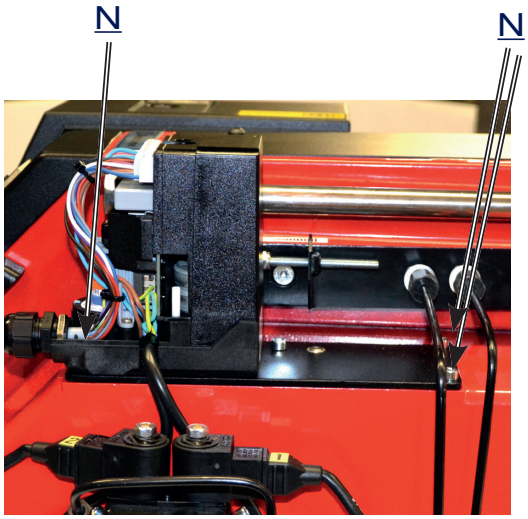
5.2 Servicing air dampers

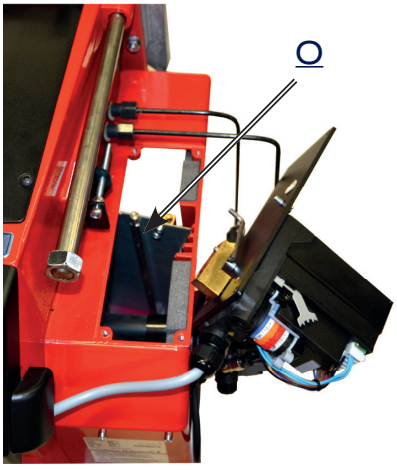
Removal and installation

1. Break the main current and disconnect the Euro plugs from the burner.

> ! If the burner is directly connected, ensure that all components on the burner are without power.

2. Remove the nuts (H) and pull the burner body out of the guides from the burner flange.
3. Remove the air intake grille.
4. Remove the screws (N) securing the mounting plate.
5. Lift and remove the damper motor with mounting plate.
6. Lift out the air damper.
7. Clean the air damper (O) and the intake. Lubricate damper shaft and bushing and control arm if applicable.
8. Refit the air damper.
9. Install the damper motor with mounting plate and control arm.
10. Fit screws (N) for the mounting plate.
11. Insert the burner and tighten the nuts (H).
12. Fit the grille and turn on the mains power.





> ! 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

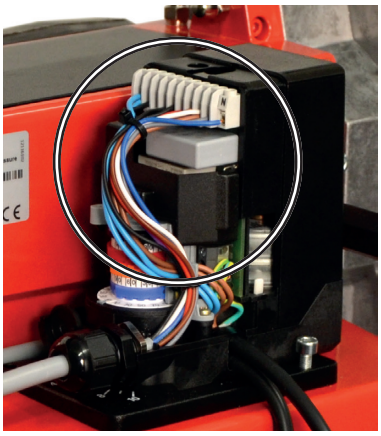
Removal and installation

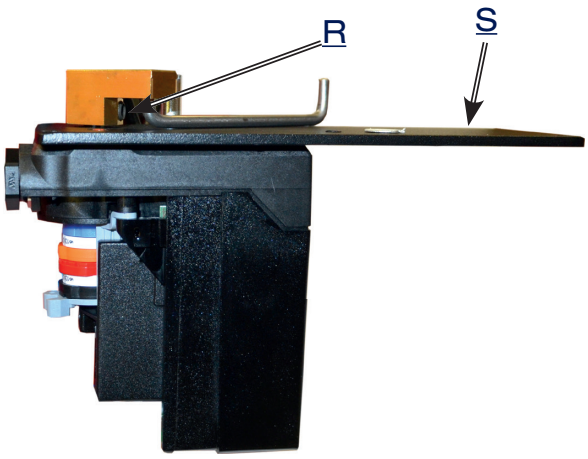
1. Switch off the mains power.

> **!** If the burner is directly connected, ensure that all components on the burner are without power.

2. Carefully note the placement of the cables in the damper motor and then disconnect them.
3. Remove the damper motor as described in the section on servicing the air damper.
4. Loosen (R) the control arm from the motor shaft.
5. Remove the damper motor from the mounting plate (S).
6. Install the new damper motor on the mounting plate.
7. Fit the control arm on the damper motor shaft. It is important that the screw is perpendicular to the plane of the shaft.
8. Remove the damper motor as described in the section on servicing the air damper.
9. Turn on the mains power.
10. Check/adjust the combustion.

> **!** Carefully note the placement of the cables before disconnecting them.



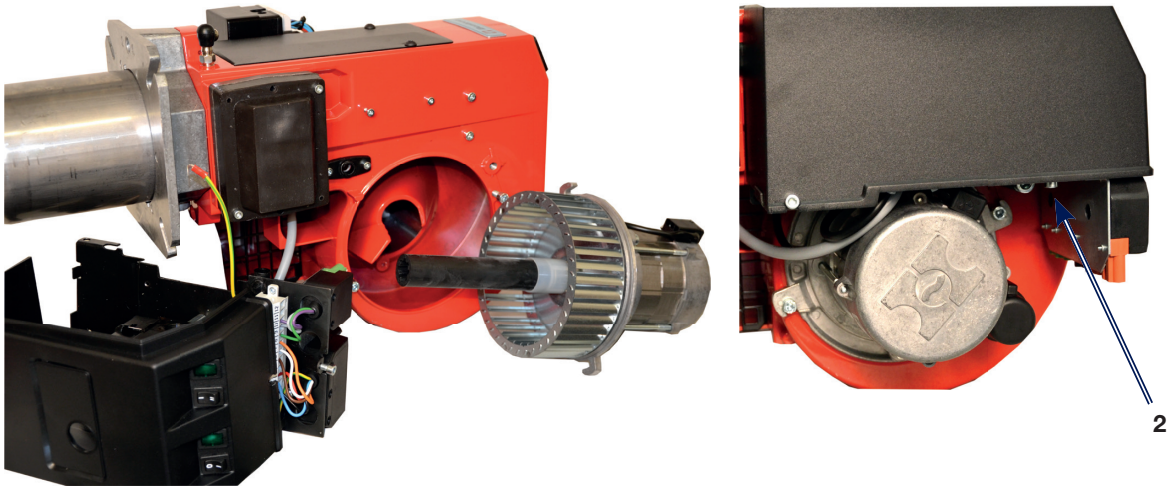


5.4 Servicing the fan

1. Make sure the power to the burner is switched off.

> **!** If the burner is directly connected, ensure that all components on the burner are without power.

2. Detach the electrical panel.
3. Disconnect the motor's electrical connection.
4. Detach and remove the motor.
5. Check the fan wheel to ensure it is firmly secured and not warped. Replace if damaged.
6. Clean or replace the fan wheel.
7. Refit the parts, test run and check combustion.



5.4.1 Replacing the drive shaft

Removal and installation

1. Make sure the power to the burner is switched off.
2. Detach the electrical panel.
3. Disconnect the motor's electrical cable.
4. Remove the motor.
5. Remove the drive shaft and drive coupling from the motor.
6. Disconnect the drive coupling from the pump.
7. Fit the coupling, pump, and motor. Make sure the drive shaft is connected correctly at both ends.

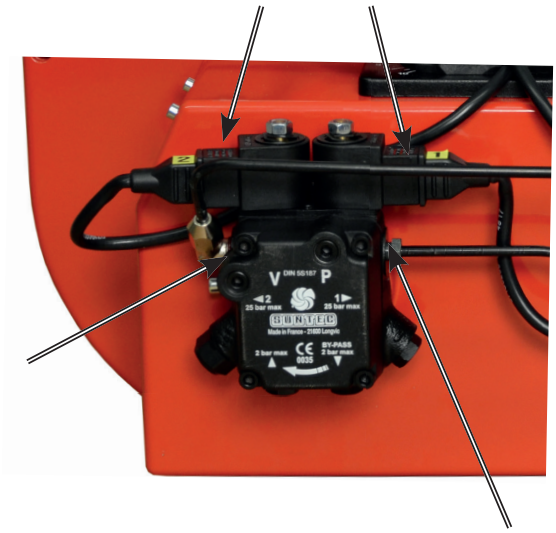
5.5 Replacement of oil pump

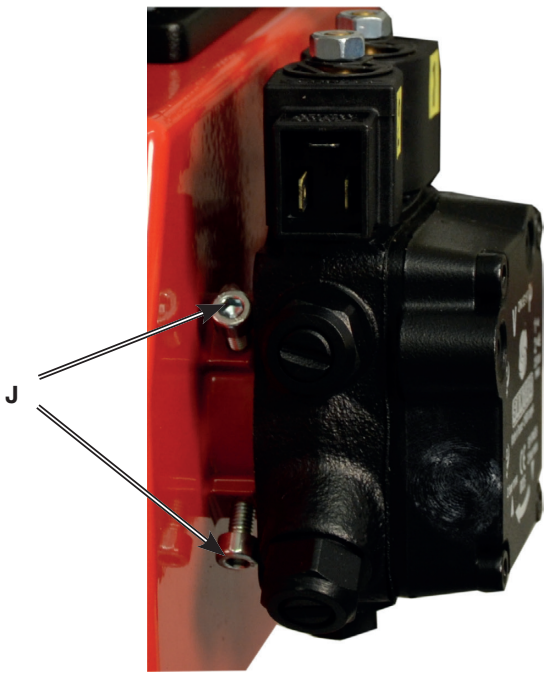
Removal and installation

1. Switch off the mains power.

> **!** If the burner is directly connected, ensure that all components on the burner are without power.

2. Disconnect hoses, connection pipes and electrical cables from the pump.
3. Loosen the screws (J) and pull out the oil pump
4. Transfer the pump coupling to the new pump.
5. Install the oil pump on the burner and tighten the screws (J). (It is important that the pump shaft splines align correctly in the pump coupling).
6. Connect hoses, connection pipes and electrical cables.
7. Turn on the mains power.
8. Bleed the pump, start the burner and set the correct oil pressure (refer to technical data for correct output).
9. Check combustion.



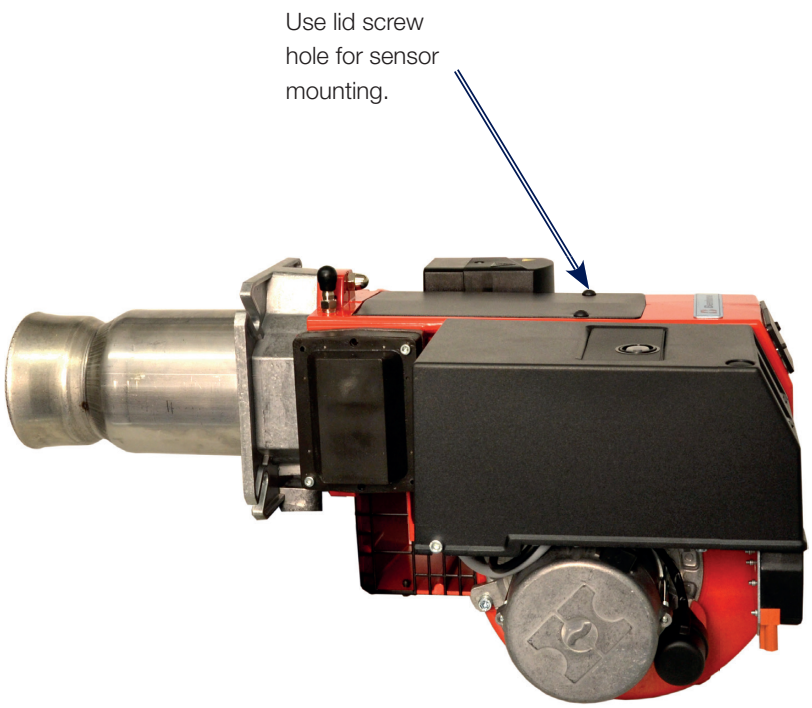


> **!** When servicing/replacing components that affect combustion, an analysis and soot test shall be carried out on the installation.

5.6 Vibration

Maximum vibration level are 5,0 mm/s.

- Check all bolts and nuts for correct torque.
- Check fan wheel for damage and contamination. Change when dirty/ unbalanced.
- Check motor bearings. If worn change motor/bearings.



5.7 Pump Danfoss RSA 60

5.7.1 Technical data

Viscosity range:	1,3–18,0 mm²/s
Pressure range:	14 bar
Oil temperature:	–10 to +70°C

5.7.2 Components

1. Pressure gauge port G 1 /8”
2. Nozzle port G 1 /8”
3. Suction line G 1/4”
4. Suction line G 1 /4”
5. Return line G 1/4”
6. Return line R 1/4”
7. By-pass plug
8. Pressure adjustment, 5 mm allen key

5.7.3 Suction line tables

The suction line tables consist of theoretically calculated values where the pipe dimensions and oil velocity have been matched sothatturbulences will not occur. Such turbulences will result in increased pressure losses and in acoustic noise in the pipe system. In addition to drawn copper piping a pipe system usually comprises 4 elbows, a non-return valve, a cut-off valve and an externa! oil filter.

The sum of these individual resistances is so insignificant that they can be disregarded. The tables do not include any lengths exceeding 100 m as experience shows that lon ger lengths are not needed.

The tables apply to a standard fuel oil of normal commercial quality according to current standards. On commissioning with an empty tube system the oil pump should not be run without oil for more than 5 min. (a condition is that the pump is being lubricated during operation).

The tables state the total suction line length in metres at a viscosity of 4,3mm²/s.

5.7.3.1 Purging

On 1-pipe systems it is necessary to purge the pump. On 2-pipe systems purging is automatic through the return line.

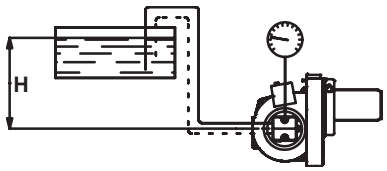
165 305 11

5.7.5 Suction pipe tables RSA 60

5.7.5.1 Overhead Tank

One-pipe system

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



Two-pipe system

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

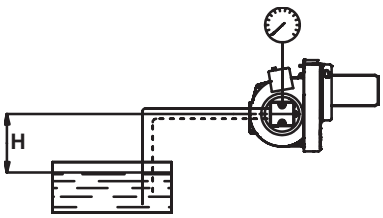
5.7.5.2 Underlying Tank

One-pipe system

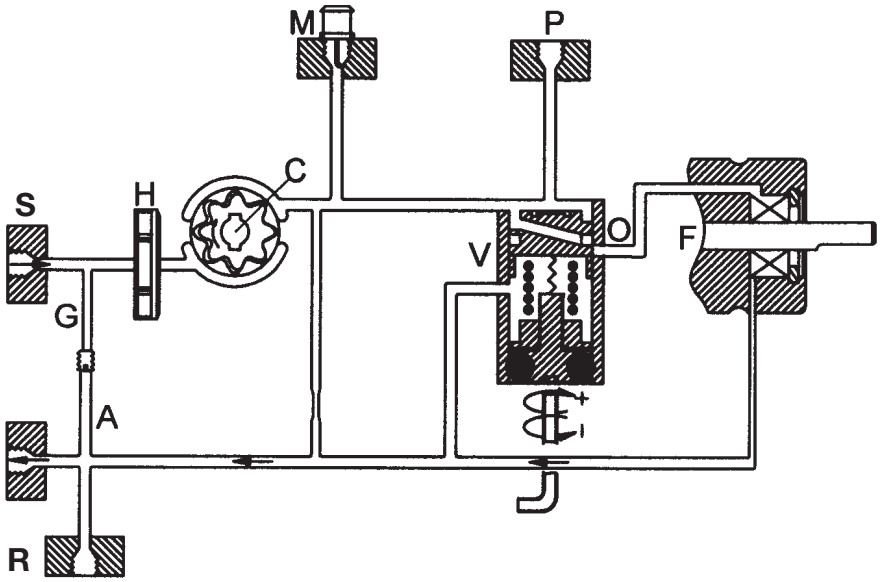
For reliable operations, use of a Tigerloop is recommended in underlying tanks.

Two-pipe system

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



5.7.4 Function RSA 28 - 40 - 60



When the pump is started oil is drawn through the suction port ”S” via filter ”H” to the suction side ofthe gearwheel set ”C”. From here the gearwheel set pumps the oil to the pressure side and at the same time the oil becomes pressurized. The oil is led tocut-offand 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.

When the pump is stopped, the pump output drops and produces a drop in the oil pressure. The spring in the regulating valve presses the regulating pisten forward until it seals in port ”P”. This cuts off the oil flow to the nozzle and ensures that the nozzle line is eftectively shut off.

the gearwheel is ableto pump underthegiven conditions, the oil pressure falls below the set value because the piston of the reg ulating 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

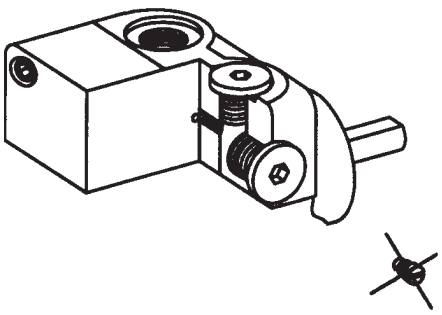
5.7.6 Mounting/dismounting bypass plug

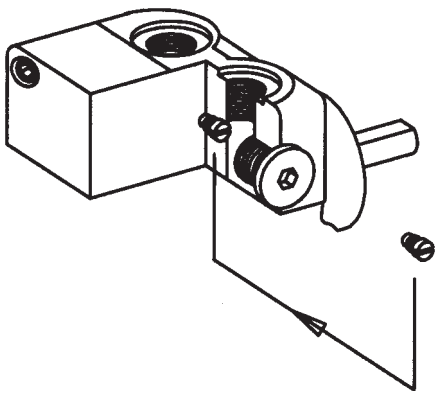
In a 2-pipe-system excess oil is led back direct to the oil tank. In a 1-pipesystem the by-pass plug must be removed so that there isa free passage back to the suction side through the return line with the return port closed.

Exchange of filter

One pipe system

Two pipe system





6. Replacement of electrical components

1. Switch off the main power.

> ! If the burner is directly connected, ensure that all components on the burner are without power.

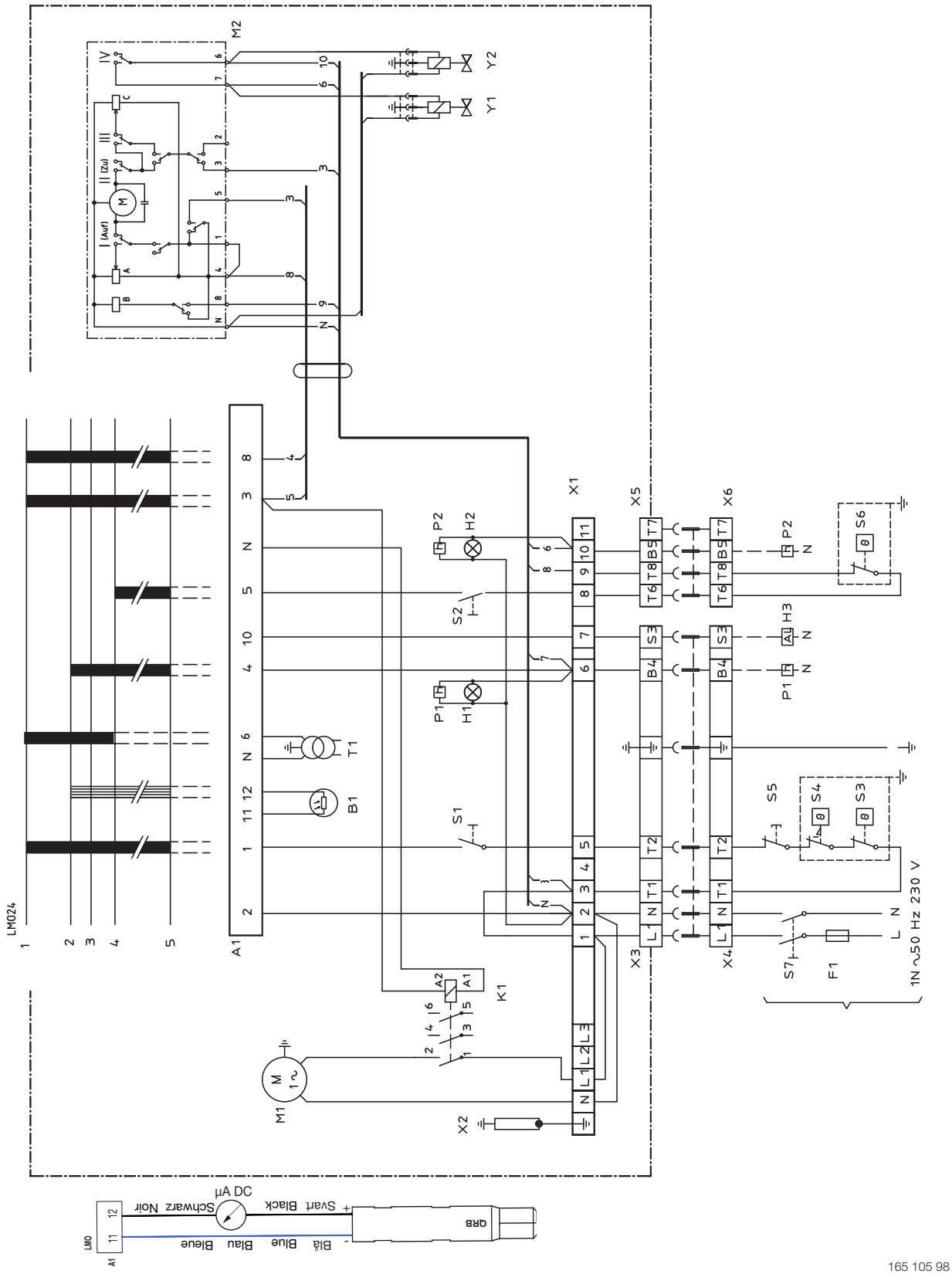
2. Note the connection of the existing component.
3. Remove the existing component.
4. Install the new component using the same wiring as the existing component or the specified alternative arrangement.
5. Turn on the main power.
6. Check the function of the new component.
7. Start the burner. Check combustion.

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

165 105 11

7. Oil burner control

7.1 Wiring diagram



165 105 98

7.1.1 List of components

A1 Oil burner control
B1 Flame detector
F1 Fuse
H1 Lamp, low capacity
H2 Lamp, high capacity
H3 Lamp, lock-out signal 230 V
K1 Thermal overload protection
M1 Burner motor
M2 Damper motor
P1 Time meter, low capacity (option)
P2 Time meter, high capacity (option)
S1 Operating switch
S2 Operating switch, high/low capacity
S3 Control thermostat
S4 Temperature limiter
S5 Micro switch for hinged door
S6 Control thermostat, high/low capacity
S7 Main switch
T1 Ignition transformer
X1 Connection terminal board
X2 Earth terminal
X3 Plug-in contact ”Euro”, burner
X4 Plug-in contact ”Euro”, boiler
X5 Plug-in contact ”Euro”, high/low burner
X6 Plug-in contact ”Euro”, high/low boiler
Y1 Solenoid valve 1
Y2 Solenoid valve 2

7.2 Function LMO14/24

1 **Switch on operating switch and twin thermostat**
A spark is formed. The air damper motor opens the damper to low load position. The burner motor starts, 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. 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.

4 **High/Low thermostat ON**
The burner is in operating position and can now change between full load and low load.

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.

! Mains connection and fuse in accordance with local regulations.

7.2.1 Technical data

	LMO14.113...	LMO24.255...
Preiginition time	15 s	25 s
Prepurge time	16 s	26 s
Postignition time	3 s	5 s
Safety lockout 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 detector current required (with flame)	45 µA dc	45 µA dc
Max perm. detector current (without flame)	5.5 µA dc	5.5 µA dc

160303-333

7.3 Colour codes LMO14/24

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

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

7.4 Fault codes LMO14/24

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

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

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

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

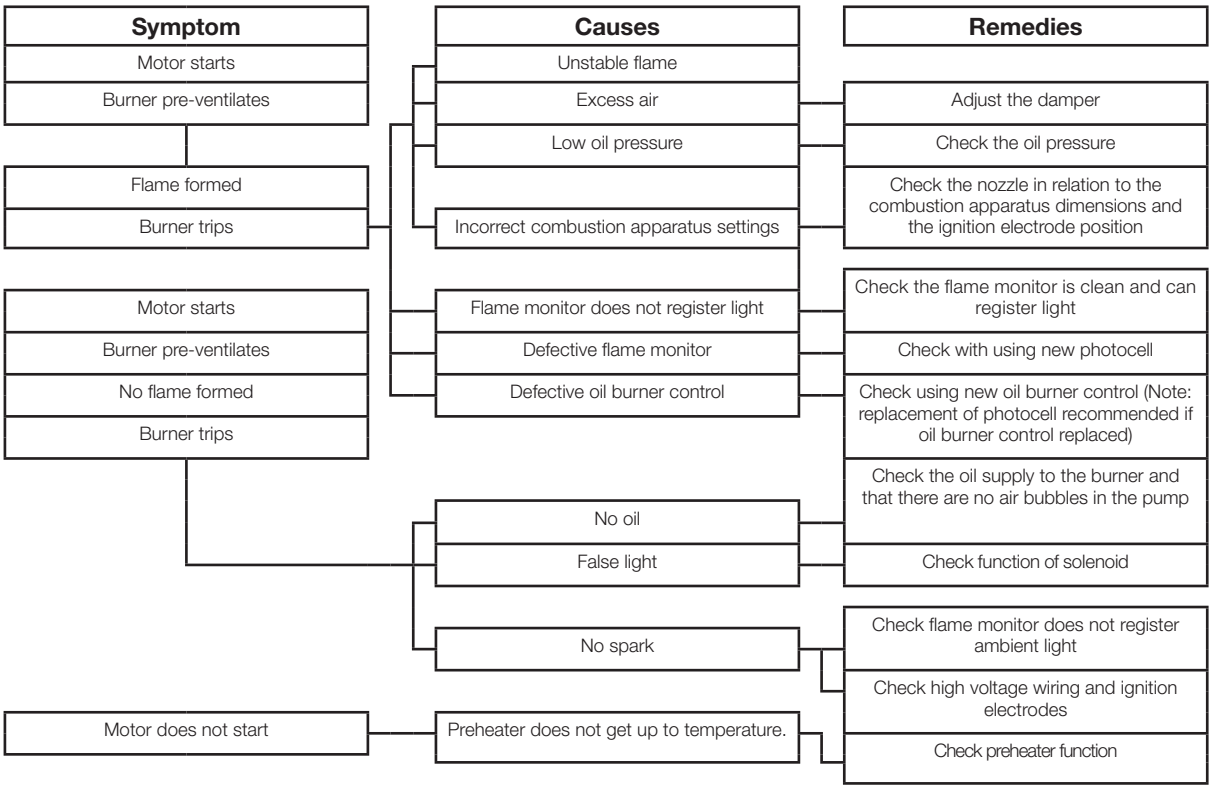
To return to normal operation: Press the reset button for 1 second.

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

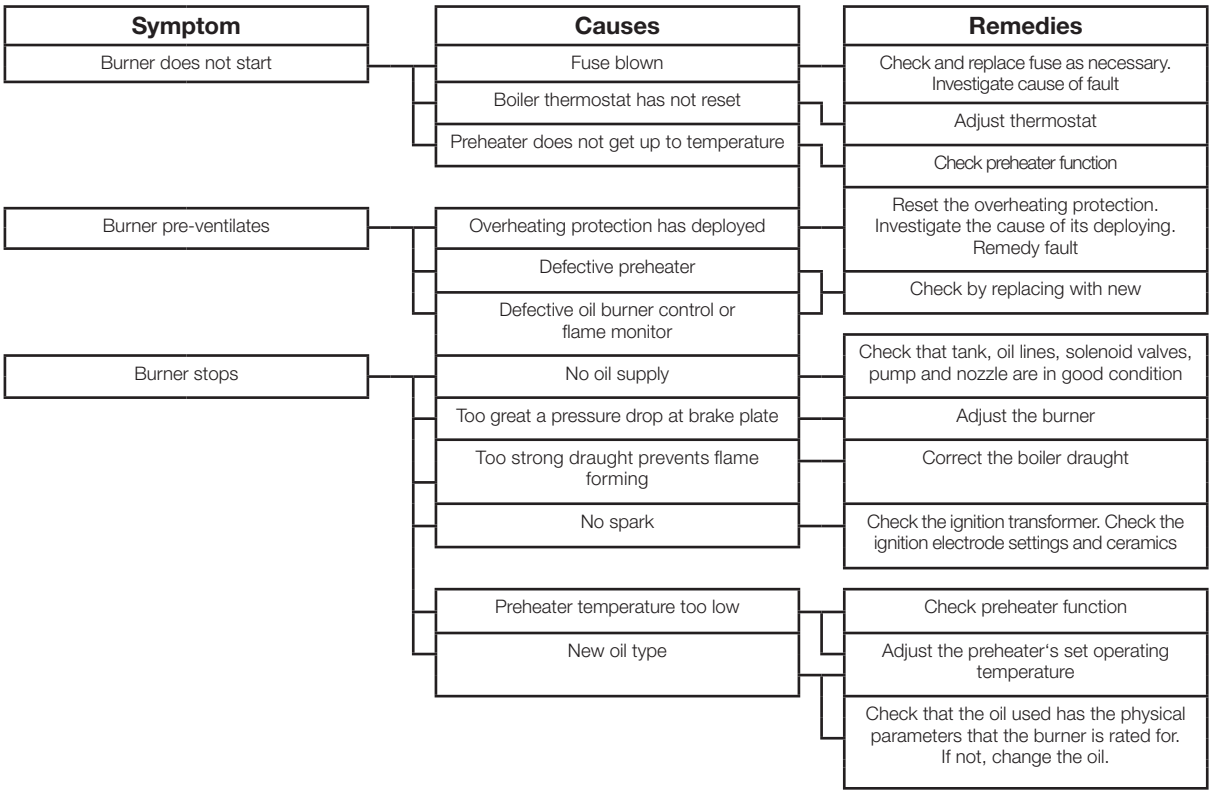
To return to normal operation: Press the reset button for 1 second.

8. Fault Location

8.1 Burner will not start



8.2 Burner will not start after normal use



8.3 Delayed ignition

Symptom	Causes	Remedies
Burner pulsates at start with hot flue gases	Excessively strong draught	Correct boiler draught
	Excessive pressure drop across the brake plate	Adjust the burner
	Preheater temperature too low	Check preheater function
	New oil type	Adjust the preheater's set operating temperature
		Ensure that the new oil's physical parameters are within the limits for which the burner is designed. If not, change the oil.
Burner pulsates at start	Nozzle partially blocked	Replace nozzle
	Oil pressure too low	Check and adjust
	Flue is blocked or damaged	Check and correct
	The fan wheel is slipping on the shaft	Check and tighten
	Pump coupling loose or worn	Replace
	Preheater blocked	Check the ignition electrode setting, (see technical data)
	Delayed ignition	Check that the ignition electrodes are not damaged
	Excessively strong draught	Check high voltage cables
		Check position of nozzle assembly setting
		Correct boiler draught
	Excessive pressure drop across the brake plate	Adjust the burner
	Preheater temperature too low	Check preheater function
	New oil type	Adjust the preheater's set operating temperature
		Ensure that the new oil's physical parameters are within the limits for which the burner is designed. If not, change the oil.

8.4 Noise in pump

Symptom	Causes	Remedies
The burner pump emits noise during start		Check the oil system in order to reduce pressure drop
The burner pump emits noise during operation	Insufficient negative pressure on the suction side pump	Rebuild the oil system to form a solution with a transport oil pump
		Check that the oil used has the physical parameters that the burner is rated for. If not, change the oil.
		Temperature of the oil from the tank is too low, increase the temperature of oil from tank
		Clean the pump filter

8.5 Pump pressure

Symptom	Causes	Remedies
The burner pump can not build up pressure	No oil	Check that there is oil and that it reaches the pump
	Oil viscosity too low	Check that the oil reaching the pump has the physical parameters that the pump can handle. Change the oil or the pump's oil parameters
	Pump worn	Replace the pump
	Pump run using impure oil that has worn the pump out prematurely	Replace pump and install self-cleaning filter in the oil system
	Blocked pump filter	Check, clean pump filter

9. Log of flue gas analysis

Owner	Adresss	Tel. no:
Installation		Tel. no:

Boiler

Type	Make	Power kW

Bentone Burner

Type	Model	Serial no.	Fuel

	Step 1	Step 2	Step 3
Draught in fireplace			
Fan Press mbar			
Filter smoke number			
CO_2			
O_2			
NOx			
CO			
Flue gas temp. °C			
Setting brake disc			
Setting Air damper			
Pump pressure bar			
Nozzle			

Test performed / 20	Address
Test performed by:	Postal address
Company name:	Tel. no:

10. Oil burners maintenance instructions

General information

Keep the boiler room clean. Ensure that the boiler room has permanent fresh air intake. Switch off before dismantling the oil burner.
At hinged mounting, make sure that an automatic safety switch is fitted, so that the burner cannot start when 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 stopcock.
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:……..

EU Declaration of conformity

CE

Bentone Oil Burners

Type

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

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+A1:2011	Excluded Annex J/K. Automatic forced draught burners for liquid fuels.

Additional information can be downloaded at:

www.bentone.com

Enertech AB
Box 309
S-341 26 LJUNGBY

Ljungby, January 26th 2021

Helene Richmond

Managing Director

Enertech AB

Enertech AB. P.O Box 309, SE-341 26 Ljungby.
www.bentone.com

Bentone®