



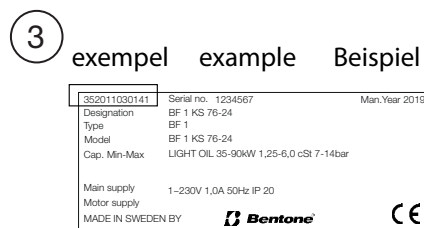
Providing sustainable energy solutions worldwide

Installation- and maintenance instruction

**B 40 A2.2 RME**

LMO24.255C2E

DV 57C



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# 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.
- 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 tubes, 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.
- The electrical installation must be professionally carried out in accordance with applicable high voltage regulations, as per Enertech's recommendations.



- Before service, shut off the fuel supply and turn off the power to the burner.
- Leak checks must be performed during installation and service 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 service.
- 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.
- Fire extinguisher with Class BE recommended.
- Modifying the design or using accessories that have not been approved by Enertech in writing is strictly prohibited.
- 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 the gas burner control has a solid red light, contact your installer.



## General requirements RME

This is a burner designed for FAME, B-100 (RME) fuel. The fuel must meet the requirements of standard EN 14214 for FAME.

The fuel must be stored and used according to the manufacturer's instructions. It should typically be used within 6 months of manufacture. Fuel that is allowed to age loses its oxidation stability and produces aggressive constituents. These cause oxidation damage to components in the oil system. The fuel should be stored in a cool area to minimise these problems.

The RME cistern must be made of metal or dark coloured plastics approved for the fuel.

The design of the equipment on the burner permits the use of EO1 type oil without modification, although with appropriate adjustments to the combustion after changing the fuel type.

Oil burners must be installed in accordance with local regulations. The installer must therefore be knowledgeable of the regulations pertaining to oil and combustion.

Installation should be carried out as a one-pipe system and used together with the bleeder to vent the system, and an appropriate filter must also be in place. Copper should be avoided in RME fuel systems since the fuel and copper have an oxidising effect on each other.

Only oil suitable for the burner must be used and then in combination with a suitable oil filter designed for FAME, B-100 (RME) and installed before the burner's oil pump.

The tank should be cleaned and the water should be checked regularly to prevent problems related to corrosion and microorganisms. This should be done once a year.

If the burner is replacing an existing burner, ensure that the oil filter is changed to a filter designed for FAME, B-100 (RME). Installation may only be performed by qualified personnel.

Care should be taken by the installer to ensure that no electrical cables or oil/gas pipelines are crushed or damaged during installation or service.

Burners that run on FAME, B-100 (RME) fuel 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 with fire-retardant sleeves. It is very important when carrying out a service to replace old parts with new parts of the same quality.

## Maintenance

The boiler/burner must be checked regularly for faults or leakage. Any boiler/burner that uses FAME (RME) fuel must be serviced at least twice a year. It is very important that worn parts are replaced at the time of servicing with new parts of the same quality.

Oil hoses must be of high-quality fluoride rubber or PTFE intended for FAME, B-100 (RME).

The hoses must be fitted with fire-retardant sleeves in order to satisfy requirements according to EN-ISO 6806.

## Burner service schedule

Servicing must be carried out twice a year or after 3,000 hours of operation.

Burner	Twice a year	3,000 h
Filter	Twice yearly replacement	3,000 h replacement
Oil hose	Once yearly replacement	
Nozzle	Twice yearly replacement	3,000 h replacement
Electrodes	Replace/Clean twice a year	Replace/Clean 3,000 h
Brake disc	Replace/Clean twice a year	Replace/Clean 3,000 h
Motor	Twice a year	3,000 h
Drive shaft	Check/replace in the event of damage	Check/replace in the event of damage
Fan wheel	Twice a year Replace if need for cleaning/imbalance	3,000 h Replace if need for cleaning/imbalance
Tank	Check for water once a year  Clean tank once a year	
Oil filter	Twice a year	3,000 h replacement
Oil valve	Tightness check twice a year	Replace if leaky

## 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
Ignition system with flame guard	10 years	250,000 cycles
UV flame sensor	10,000 h	N/A
Damper motor		500,000 cycles
Contactors	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

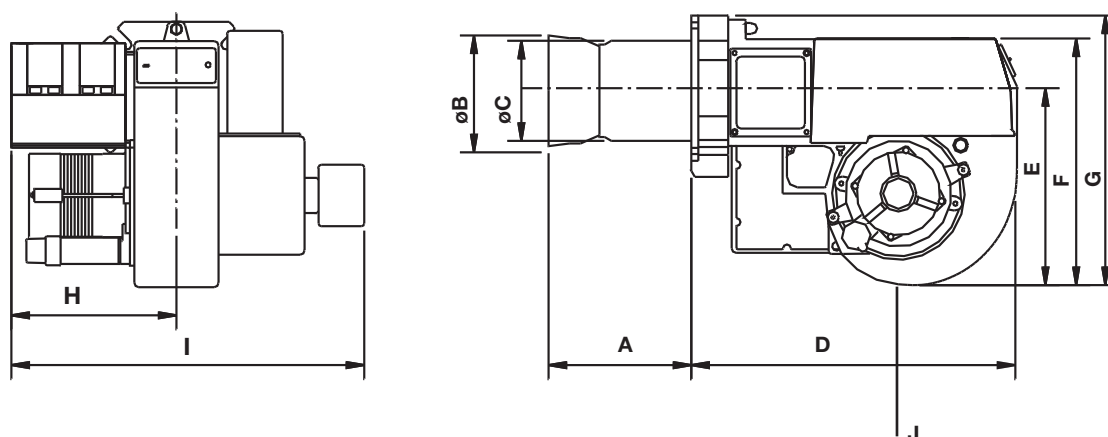
The burner is intended for:

- 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 40 A2.2

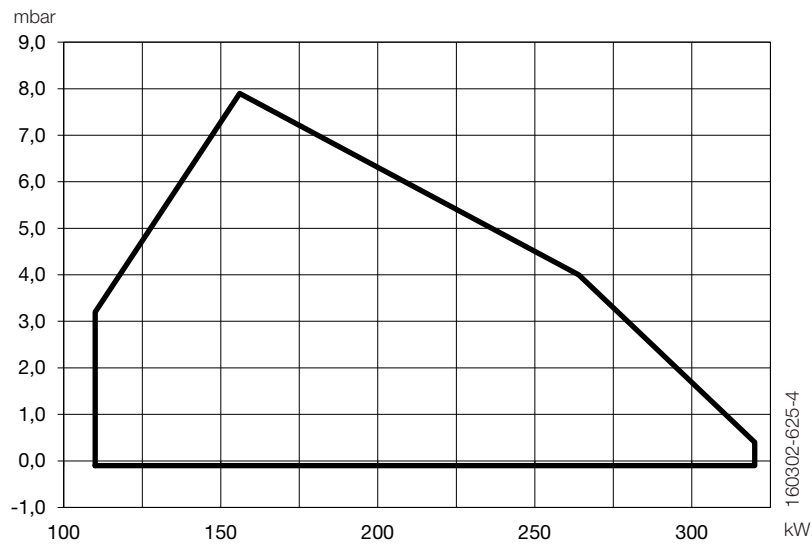


	A	Ø B	Ø C	D	E	F	G	H	I	* J
<b>B 40</b>	172/274/372	130	114	420	260	310	360	207	435	200

\* Min. recommended distance to floor.

## 2.2 Working field B 40 A2.2

9.3-27.0 kg/h  
110-320 kW

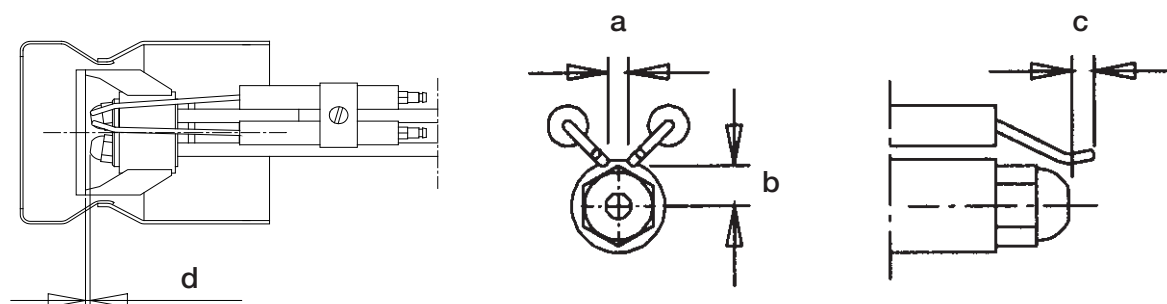


## 2.3 Electric Specification

Burner correspond to IP 20

Type	Motor	Complete burner	Sound
<b>B 40</b>	250W 230V 1,7A 50Hz 8μF	230V 3,03A 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 40	3.5-4.0	5,0-6,0	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.

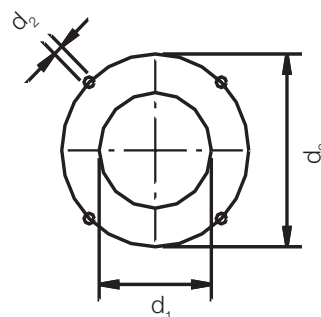
Nozzle:	45° Solid/semisolid
	60° Solid/semisolid
	80° Solid/semisolid
Pump pressure	10 bar (8-25 bar) depending on pump model

## 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 <sub>1</sub>	d <sub>2</sub>	d <sub>3</sub>
B 40	ø 115 (130)	M14	ø 200-250



## 2.7 Nozzle table

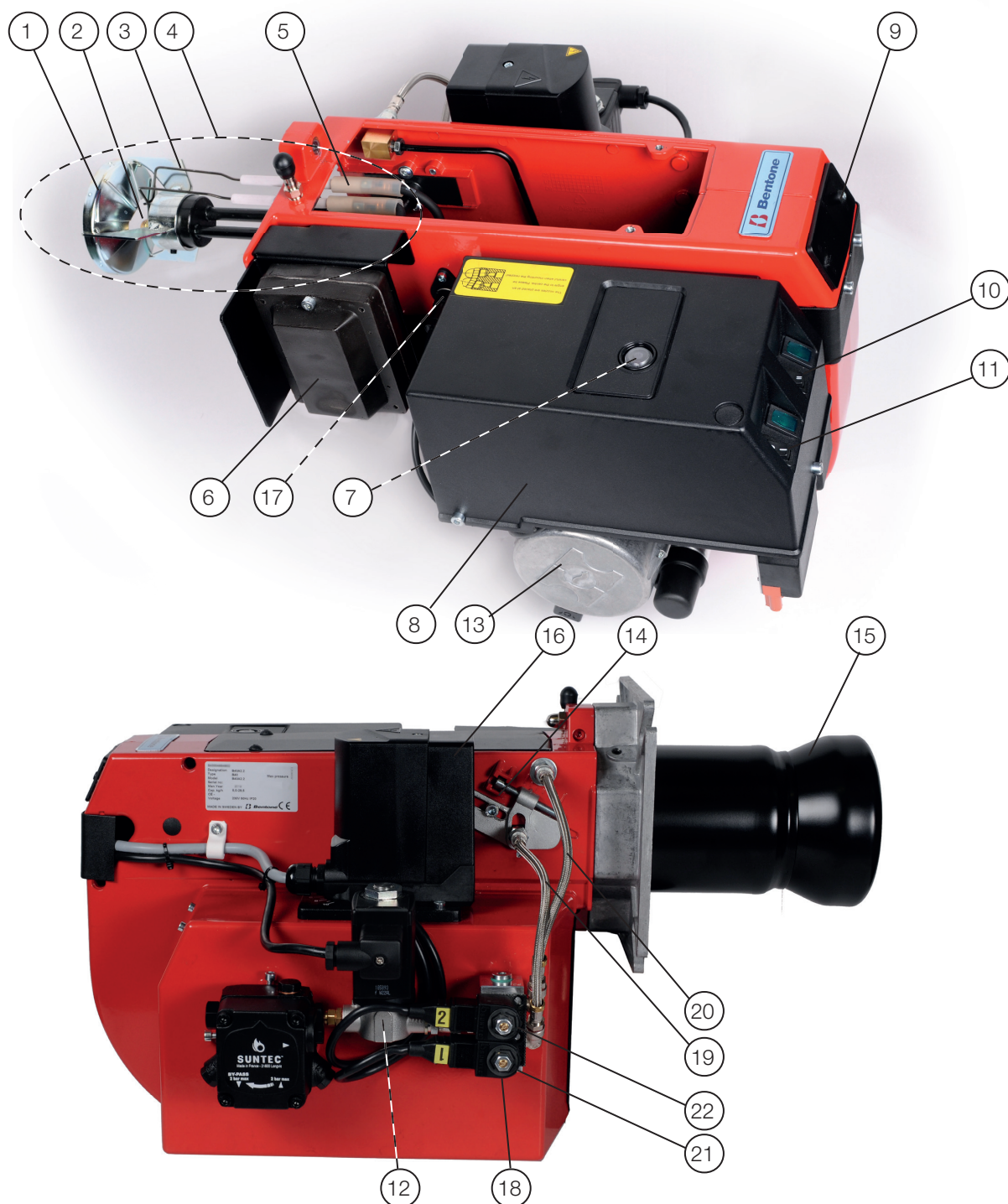
Pump pressure bar 10				11			12			13		
Gph	kg/h	kW	Mcal/h	kg/h	kW	Mcal/h	kg/h	kW	Mcal/h	kg/h	kW	Mcal/h
1,00	3,72	44	38	3,90	46	40	4,08	48	42	4,24	50	43
1,10	4,09	48	42	4,29	51	44	4,48	53	46	4,67	55	48
1,20	4,47	53	46	4,68	55	48	4,89	58	50	5,09	60	52
1,25	4,65	55	47	4,88	58	50	5,10	60	52	5,30	63	54
1,35	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	36,71	435	374	38,19	453	389
9,50	35,37	419	361	37,09	440	378	38,74	459	395	40,31	478	411
10,00	37,23	441	380	39,04	463	398	40,78	484	416	42,44	503	433
11,00	40,96	486	418	42,94	509	438	44,86	532	457	46,68	554	476
12,00	44,68	530	456	46,85	556	478	48,94	580	499	50,92	604	519
14,00	52,12	618	531	54,65	648	557	57,10	677	582	59,41	705	606
16,00	59,57	706	607	62,46	741	637	65,26	774	666	67,90	805	692
18,00	67,02	795	683	70,27	833	717	73,41	871	749	76,39	906	779
20,00	74,47	883	759	78,08	926	796	81,57	967	832	84,87	1007	865
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<sup>2</sup>/s at a density of 830 kg/m<sup>3</sup>.

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<sup>2</sup>/s at a density of 830 kg/m<sup>3</sup>.

## 2.8 Description



- |                         |                                  |                             |
|-------------------------|----------------------------------|-----------------------------|
| 1. Brake plate          | 9. Cover, inspection glass       | 17. Flame detector          |
| 2. Nozzle               | 10. Switch I-II                  | 18. Solenoid valve block    |
| 3. Ignition electrodes  | 11. Switch 0-I                   | 19. Connecting pipe Stage 1 |
| 4. Nozzle assembly      | 12. Solenoid valve, safety valve | 20. Connecting pipe Stage 2 |
| 5. Ignition cable       | 13. Motor                        | 21. Solenoid valve 1        |
| 6. Ignition transformer | 14. Nozzle assembly adjustment   | 22. Solenoid valve 2        |
| 7. Reset button         | 15. Blast tube                   |                             |
| 8. Electric panel       | 16. Damper motor                 |                             |

## 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 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

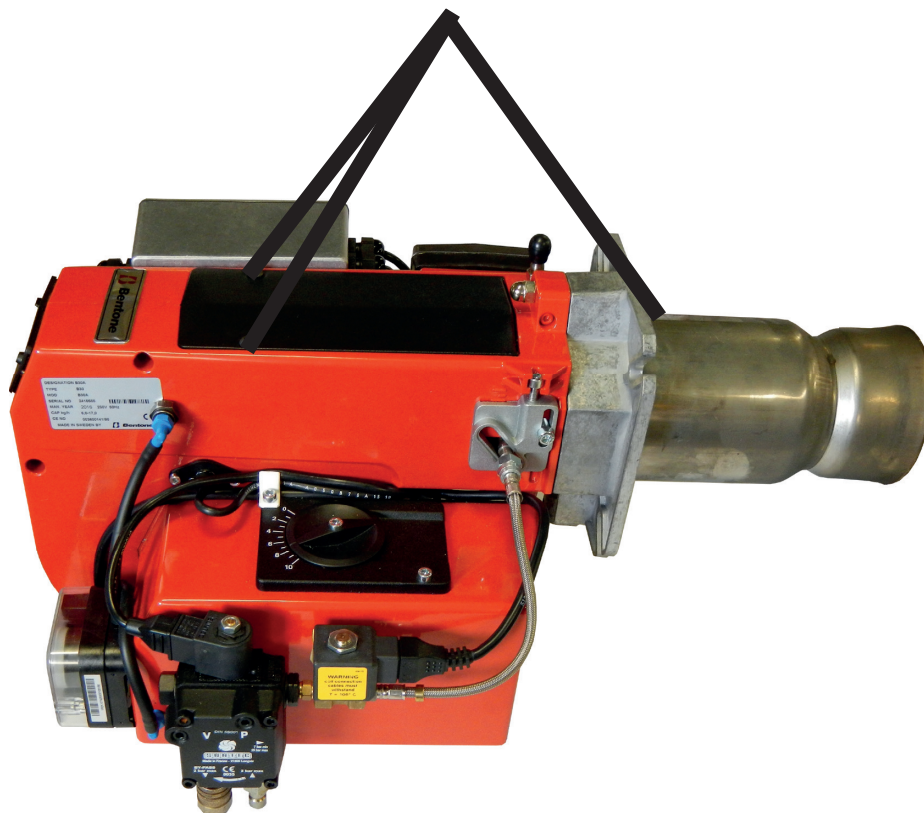
The boiler/burner should be examined regularly for any signs of malfunction or oil leakage, (see Service schedule).

#### 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

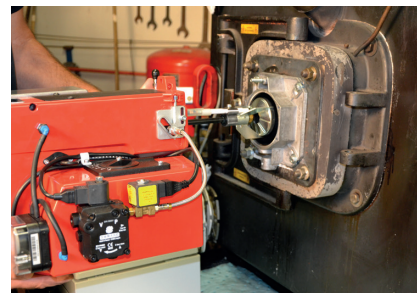
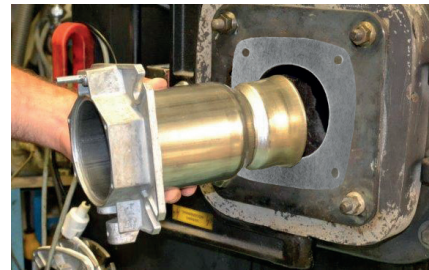
- Before work on the electrical connection, the current should be disconnected so that the installation is isolated.
- Electrical connection must be done in accordance with the applicable regulations.
- Burners should be connected to an isolator switch.
- The connection should be made in accordance with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

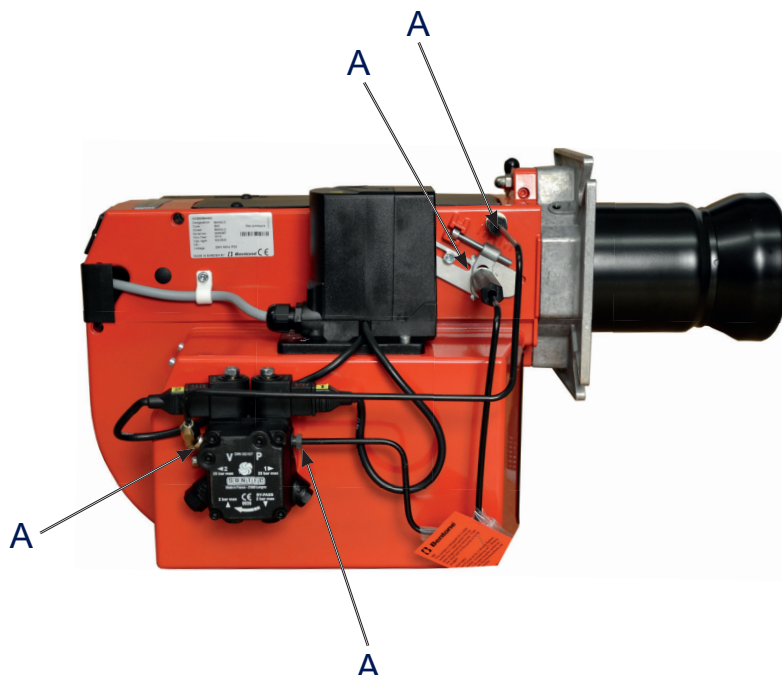


**!** If the burner tube must be installed from the inside of the boiler, this means that the boiler must be opened or have a spectacle flange that is designed so that it can be reconnected with the burner tube mounted.

## 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.



165 105 46

## 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

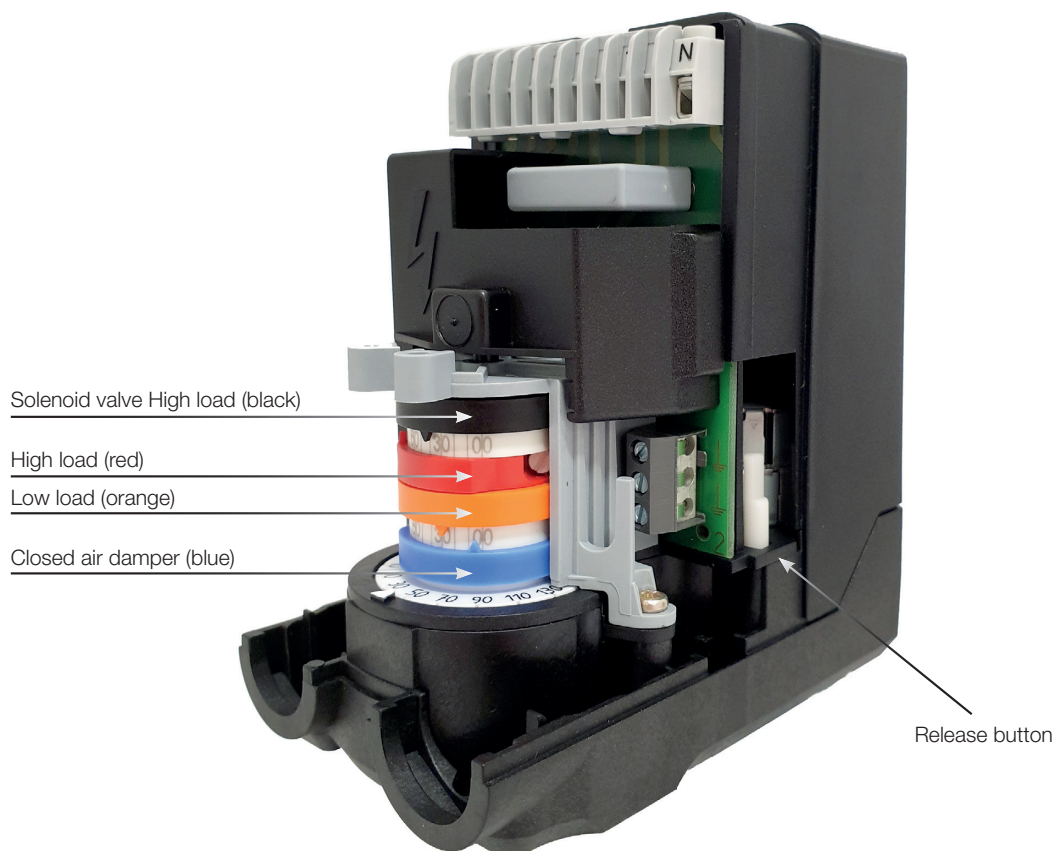
- Set control switch for load position to position II (high load).
- Turn orange cam disc to 0° to reduce airflow and to 90° to increase airflow.
- Return the control switch to position I (low load) and check the combustion values.

### 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 40 A2.2

Burner output	250 kW
Estimated nozzle output	250 kW/11,86 kWh/kg* = 21 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	9,0 bar	
Nozzle	6,0 gph	6,0 gph distributed to two nozzles, e.g. 4.0 gph at stage-1 and 2,0 gph at stage-2

### Basic settings

The setting value for 250 kW in accordance with basic setting tables. For the correct procedure when implementing settings, see below Nozzle assembly control, brake plate B 40-2. Air setting 6,3

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 40-2

Burner output	250 kW
	$250 / 11,86 = 21 \text{ kg/h}$ 9bar

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

Step 1	4,00 Gph = 167kW
Step 2	2,00 Gph = 84kW

#### Basic setting B 40-2

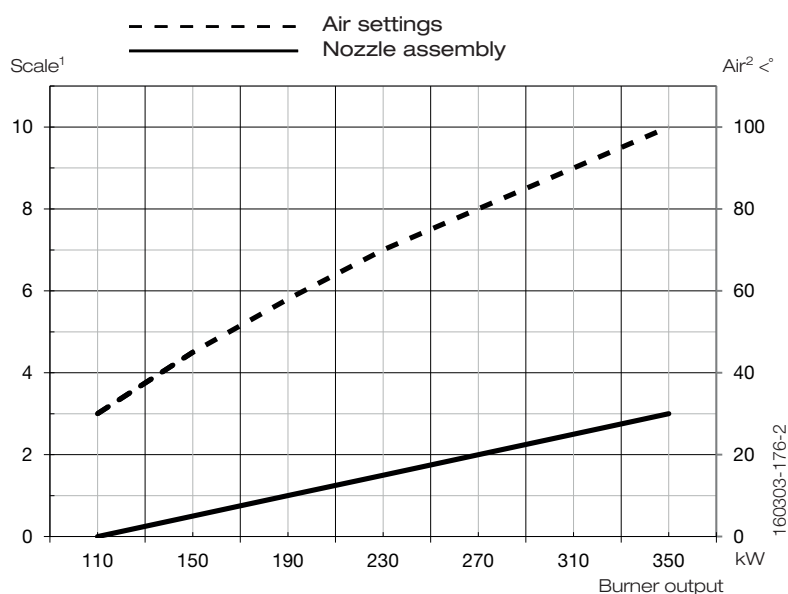
The values are available in the tables for setting values of inserts or air dampers.

Insert	250kW=2	
Low load air damper, orange		=50°
MV2 Open, black		=60°
Air damper step 2, red		=75°

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 assembly and air damper B 40 A2.2, B 40 A2.2H



<sup>1</sup> Scale nozzle assembly and air damper without damper motor.

<sup>2</sup> Settings air damper with damper motor.

### 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 <sub>2</sub>
	% O <sub>2</sub>	% CO <sub>2</sub> Lambda 1.2	
Light oil, B10 heating oil/ biofuel blend (as defined in DIN V51603-6)	4±1	≈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.

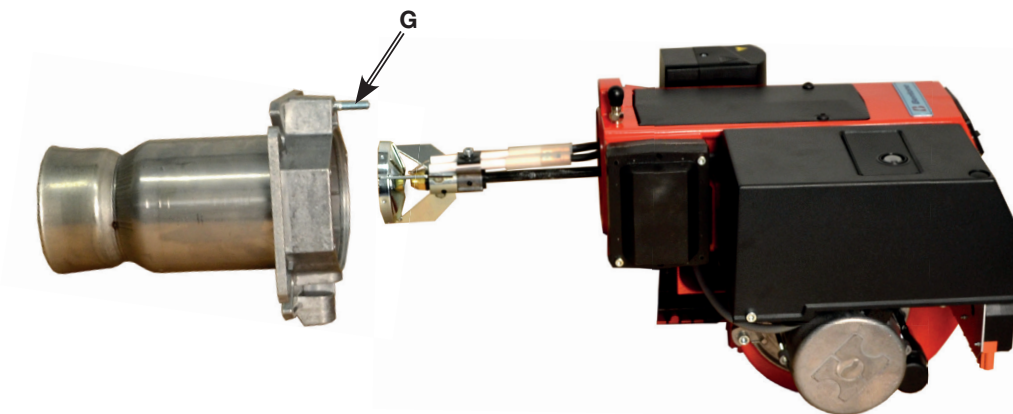
2. Loosen the nut (G) and remove the burner body from the burner flange.
3. Remove the brake plate from the oil pipe and clean the brake plate.
4. Unscrew the nozzle/nozzles.
5. Install new nozzle/nozzles.
6. Install the brake plate. (see technical data)
7. Check the ignition electrodes. (see technical 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.

## 5.2 Servicing air dampers

### Removal and installation

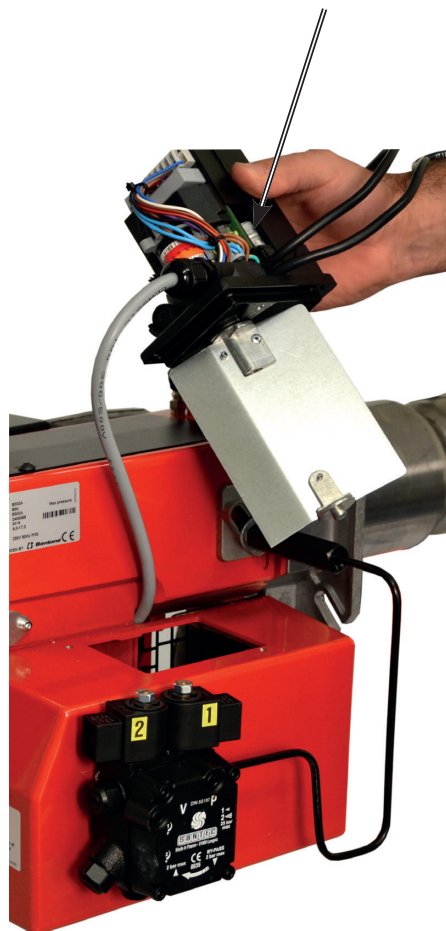
1. Break the main current and disconnect the Euro plugs from the burner.

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

2. Remove the damper motor cover.
3. Detach the solenoid valve cables from the pump.
4. Remove the intake grille at the air intake.
5. Disconnect the damper motor. Releasing button
6. Remove the screws (H) securing the damper motor mounting plate.
7. Turn the damper approx. 60°.
8. Lift up the damper motor.
9. Clean the air damper and the intake. Lubricate any damper shaft.
10. Re-install the damper motor and mounting plate on the air intake. Make sure the damper axle is properly mounted.
11. Install the intake grille for the air intake.
12. Release the damper motor release button.
13. Check/adjust the combustion.

#### Releasing button:

By pressing the button and snapping it down, the motor will be released and the damper can easily be turned. This function facilitates an exchange of damper motor.



**!** 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.

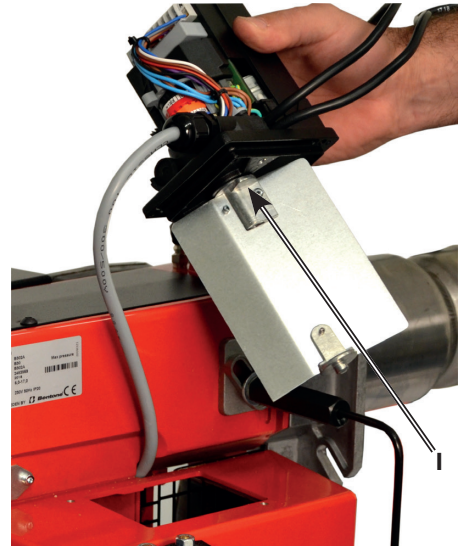
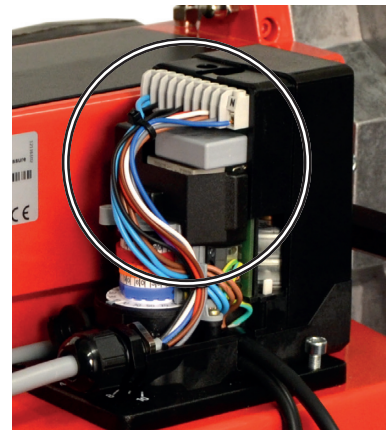


If the burner is directly connected, ensure that all components on the burner are without power.



Carefully note the placement of the cables before disconnecting them.

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. Remove the damper from the damper axle (I)
5. Remove the damper motor from the mounting plate.
6. Mount the damper to the damper axle.
7. Install the new damper motor on the mounting plate.
8. Connect the damper motor's cables.
9. Re-install the damper motor and mounting plate on the air intake according to the instructions on servicing the air damper.
10. Turn on the mains power.
11. Check/adjust the combustion.



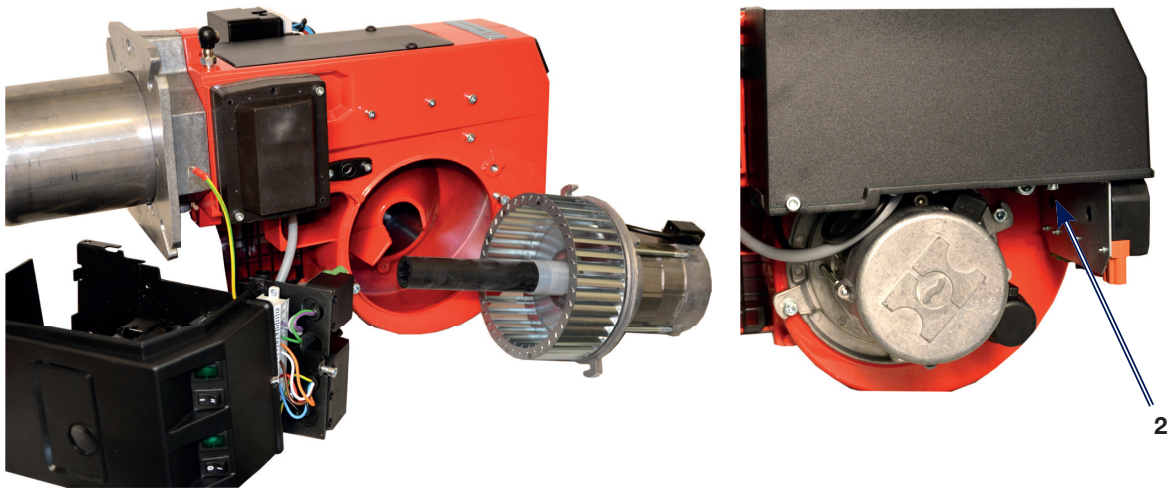
## 5.4 Servicing the fan

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

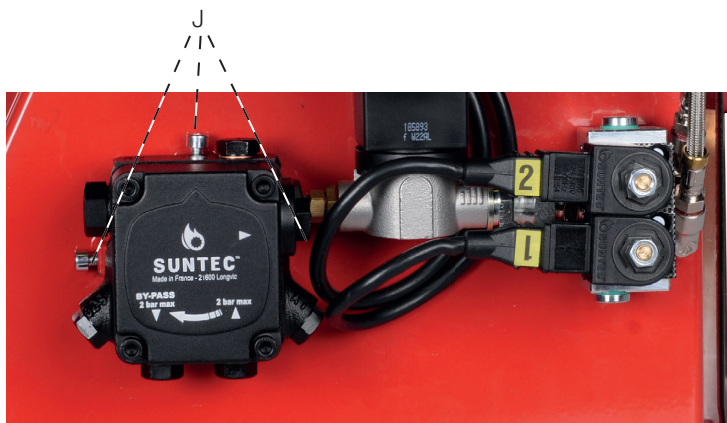
### Removal and installation

1. Switch off the mains power.



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

2. Disconnect the oil lines and electrical connections from the pump and valves
3. Disconnect the solenoid valve block from the safety valve
4. Loosen the screws (J) and pull out the oil pump
5. Remove the safety valve from the pump.
6. Transfer the pump coupling to the new pump.
7. Fit the safety valve to the new pump.
8. 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).
9. Refit the valve block and safety valve.
10. Connect the oil lines and electrical cables.
11. Turn on the mains power.
12. Bleed the pump, start the burner and set the correct oil pressure (refer to technical data for correct output).
13. Check combustion.



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

## 5.6 Check oil line seals

Once the burner has been installed and commissioned, the seals in the oil system must be checked.

Once the burner has been installed and commissioned, the seals in the oil system must be checked.

## 5.7 Solenoid valve seal test

### 5.7.1 Burner with single solenoid valve/valves

- Disconnect the power supply to the solenoid valve Y1/solenoid valves Y2 and Y3
- Run the motor and pump
- Make sure that no oil seeps from the nozzle/nozzles. If oil seeps out, the solenoid valve is leaky.

### 5.7.2 Burner with safety solenoid valve

Seal check of safety solenoid valve Y1S.

- Disconnect the power supply to the Y1S safety solenoid valve.
- Provide power to solenoid valve Y1.
- For multi-stage burners, it is sufficient to power one valve.
- Run the motor and pump.
- Make sure that no oil seeps from the nozzle.
- If oil seeps out from the nozzle, the solenoid valve is leaky.

### Seal check of solenoid valve Y1/valvesY2 ochY3

- Disconnect the power supply to the solenoid valves Y1, Y2 and Y3
- Provide power to safety solenoid valve Y1S.
- Run the motor and pump.
- Make sure that no oil seeps from any of the nozzles.  
If oil seeps out from the nozzle, the solenoid valve is leaky.



Use Loctite 5188 on threaded oil pipelines.



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

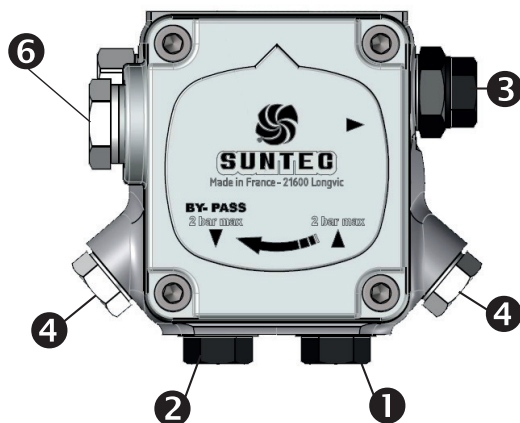
## 6. Instructions Pump

### 6.1 SUNTEC D(V) 57C

#### Technical data

##### One or two-pipe system.

Viscosity range:	2 - 75 mm <sup>2</sup> /s mm <sup>2</sup> /s
Pressure range:	10 - 28 bar
Rated voltage of coil:	220/240V 50/60 Hz
Oil temperature:	max 90°C



#### Components

1. Suction
2. Return and internal by-pass plug
3. Nozzle outlet
4. Pressure gauge port
5. Vacuum gauge port
6. Pressure adjustment

## Pump operating principle for D(V) 57C

The SUNTEC D oil pump is specially adapted for heavy oil (up to 75 cSt) and high working temperature (up to 90°C).

### Applications

- B10 heating oil/biofuel blend (as defined in DIN V51603-6), medium and heavy oils.
- One-pipe or two-pipe system.
- System with in-line solenoid valve for cut-off.

### Pump operating principle

The gear set draws oil from the tank through the built-in filter and transfers it to the valve that regulates the oil pressure to the nozzle line.

All oil which does not go through the nozzle line will be dumped through the valve back to the return line, in a two-pipe installation or, if installation is one-pipe, back to the suction port in the gear set. In that case the by-pass plug must be removed from the return port and the return port sealed by steel plug and washer.

### Bleed

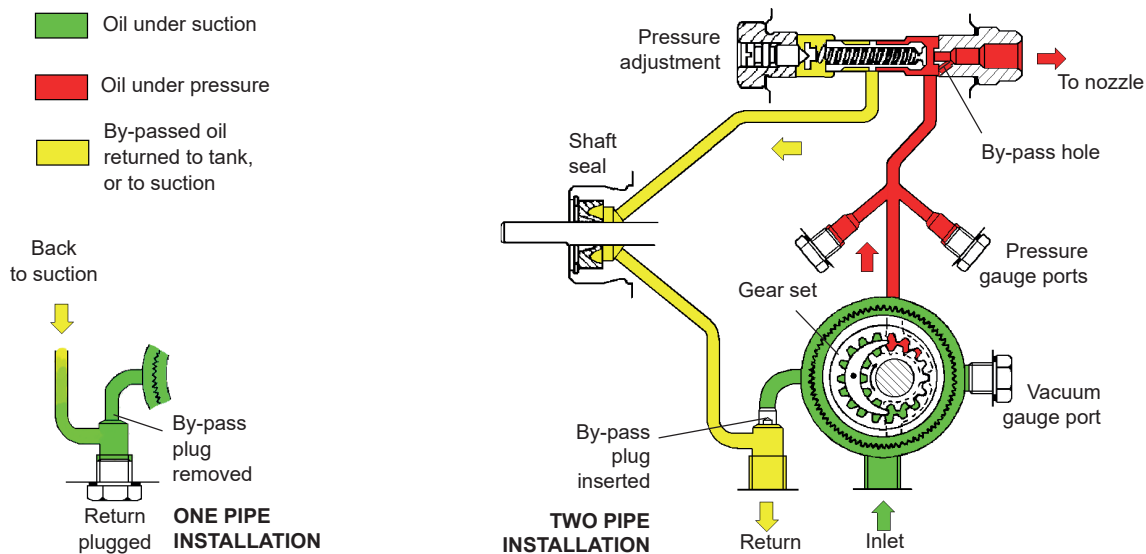
Bleeding in two pipe operation is automatic. In one pipe operation, during the starting period, air is purged through the nozzle line : the by-pass hole of the nozzle plug allows air to pass to the nozzle line without opening of the regulator valve.

For the first start up, bleeding can be accelerated by loosening the plug in a pressure gauge port. system

### Note

Owing to the presence of the nozzle by-pass hole, the pump has no cut-off function. Cut-off must be provided by an external solenoid valve.

Models gear sizes "45" and "55" have a piston with a bleed slot to avoid build up of pressure in the nozzle and suction lines during shut down due to the expansion of oil caused by nozzle line heaters.



## 6.1.1 Suction line tables

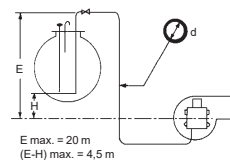
### 6.1.1.1 Overlying tank

#### 1-pipe system

Nozzle*/Düse* Gicleur*/Ugello* (US GPH)		0,50	0,60	0,80	1,00	1,50		2,00		4,00			6,00			9,50			
H (m)	d (mm)	4	4	4	4	4	6	4	6	4	6	8	4	6	8	4	6	8	10
0		90	75	56	45	30	150	22	113	11	56	150	7	37	119	4	23	74	150
0,5		100	83	63	50	33	150	25	126	12	63	150	8	41	133	4	26	83	150
1		110	92	69	55	37	150	27	139	13	69	150	8	46	146	5	28	92	150
2		131	109	82	66	44	150	33	166	16	82	150	10	55	150	6	34	109	150
3		152	126	95	76	50	150	38	192	18	96	150	12	63	150	7	39	127	150
4		172	144	108	86	57	150	43	218	21	109	150	14	72	150	8	45	144	150

\*A2L pumps : sum up the 2 nozzles / A2L-Pumpen : Summe der zwei Düsen  
pompe A2L : somme des 2 gicleurs / Per le pompe A2L aggiungere n. 2 ugelli

One pipe siphon feed system  
Einstranginstallation - Tank höher als Pumpe  
Installation monotubo en charge  
Impianti monotubo a sifone

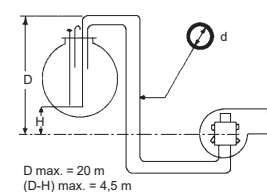


#### Two-pipe system

Pump/Pumpe Pompe/Pompa Q** (l/h)		35/45 60				55 77				65 102				75 130				95 150			
H (m)	d (mm)	4	6	8	10	6	8	10	12	6	8	10	12	8	10	12	14	8	10	12	14
0	2	15	50	124	11	38	96	150	7	27	71	150	20	54	116	150	16	46	100	150	
0,5	2	16	56	138	12	42	107	150	8	31	79	150	23	61	130	150	19	52	112	150	
1	2	18	61	150	13	47	118	150	9	34	88	150	26	68	144	150	21	57	124	150	
2	3	22	73	150	16	56	141	150	11	41	105	150	31	81	150	150	26	69	148	150	
3	4	26	85	150	19	66	150	150	13	48	122	150	36	94	150	150	31	81	150	150	
4	4	30	97	150	22	75	150	150	16	55	139	150	42	108	150	150	35	92	150	150	

\*\*Q = pump capacity @ 0 bar / Pumpenleistung bei 0 bar  
capacité de l'engrenage à 0 bar / portata della pompa a 0 bar.

Two pipe siphon feed system  
Zweistranginstallation - Tank höher als Pumpe  
Installation bitubo en charge  
Impianti bitubo a sifone



### 6.1.1.2 Underlying tank

#### 1-pipe system

With an underlying tank a 1-pipe-system is not recommended

#### Two-pipe system

Pump/Pumpe Pompe/Pompa Q** (l/h)	35/45 60				55 77				65 102				75 130				95 150			
H (m) \ d (mm)	6	8	10	12	6	8	10	12	6	8	10	12	8	10	12	14	8	10	12	14
0	15	50	124	150	11	38	96	150	7	27	71	150	20	54	116	150	16	46	100	150
0,5	13	44	109	150	9	33	84	150	6	24	62	132	17	48	103	150	14	40	88	150
1	11	38	95	150	8	29	73	150	4	20	54	115	15	41	89	150	12	34	76	144
2	7	26	66	138	5	19	51	107	2	13	37	80	9	28	61	116	7	23	52	100
3	3	14	37	79		10	28	60		6	20	44	4	14	33	65		11	28	56
4			8	19			5	14				9			6	14			4	11

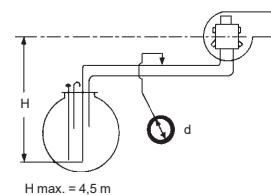
The suction line tables consist of theoretically calculated values where the pipe dimensions and oil velocity have been matched so that tur-bulences will not occur. Such tur-bulences will result in increased pressure losses and in acoustic noise in the pipe system. In addition to drawn copper piping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

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

The tables apply to a standard fuel oil of normal commercial quality according to current standards. On commis- sioning 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 nozzle capacity of 9,5 Gph. Max. permissible pressure at the suction and pressure side is 2,0 bar.

Two pipe lift system  
Zweistranginstallation - Tank tiefer als Pumpe  
Installation bitube en aspiration  
Impianti bitubo in aspirazione



### 6.1.3 Check oil line seals

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

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



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

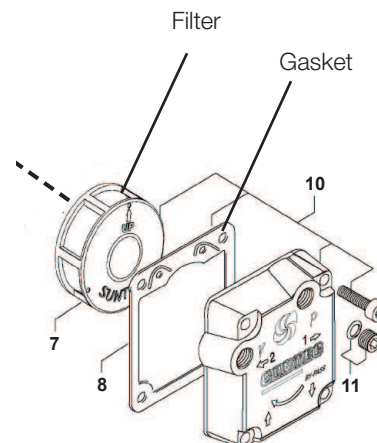


When servicing oil bearing components, check for oil leakage when the burner is commissioned after servicing.

### 6.1.2 Replacement of pump filter

#### Removal and installation

1. Close the oil supply to the burner
2. Loosen the pump cover's screws.
3. Remove the filter and gasket
4. Mount new gasket and filter
5. Refit the cover
6. Open the oil supply
7. Start the burner and check seals and combustion



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

## 6.1.4 Replacing the gasket seal (pump)

### Removal and installation

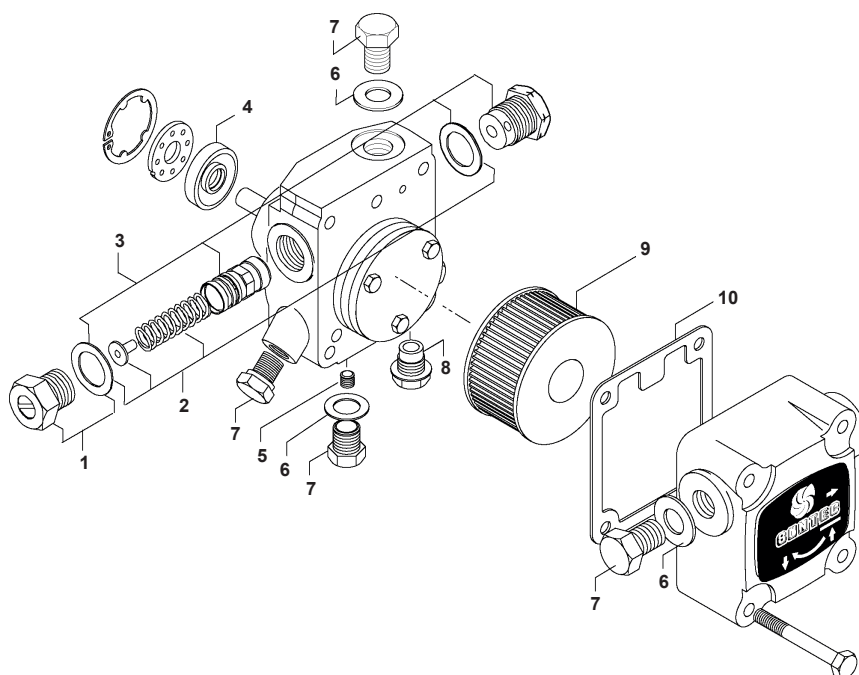
1. Disconnect hoses, oil pipes, and electrical cables



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

2. Loosen the pump (screw J)
3. Loosen the gasket seal's locking rings
4. Remove the old gasket seal (2)
5. Install the new gasket seal
6. Connect hoses, oil pipes, and electrical cables
7. Test run and check seals

1. Pressure adjusting plug assy (screw driver slot)
2. Pressure regulator kit 10 - 28 bars
3. No cut-off" piston + short nozzle plug
4. Shaft seal kit (lip seal + protective cone)
5. By-pass plug
6. G 1/4 gasket
7. G 1/4 steel plug
8. G 1/4 plastic plug
9. Filter
10. Cover gasket



## 7. 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.

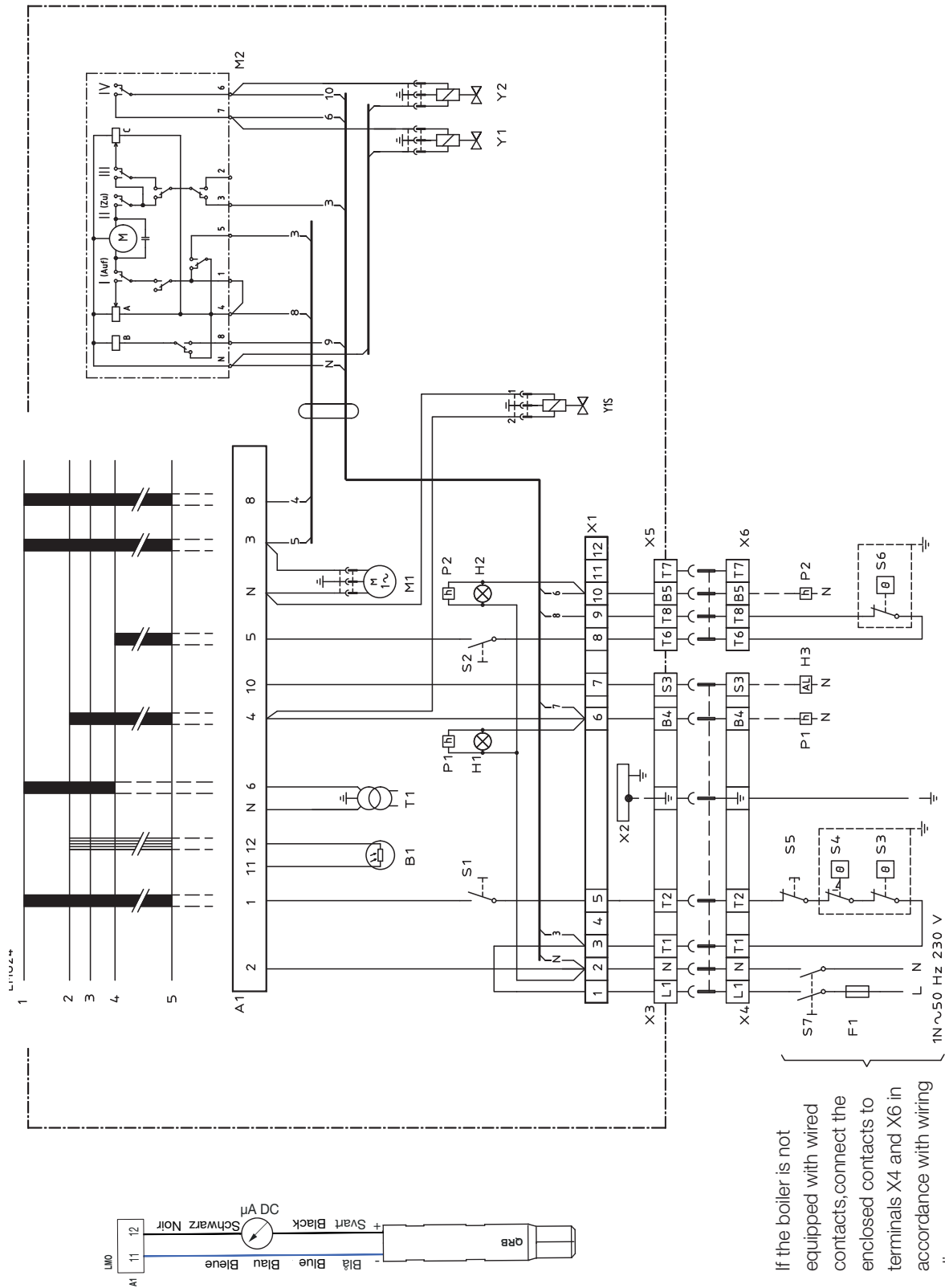
2. Note the connection of the existing component.
3. Remove the existing component.
4. Install the new component using the same wiring as the existing component or the specified alternative arrangement.
5. Turn on the main power.
6. Check the function of the new component.
7. Start the burner. Check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



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

## 8. Oil burner control

### 8.1 Wiring diagram




### 8.1.1 List of components

A1 Oil burner control	P2 Time meter, high capacity	X1 Connection terminal board
B1 Flame detector	(optional)	X2 Earth terminal
F1 Fuse	S1 Operating switch	X3 Plug-in contact, burner
H1 Lamp, low capacity	S2 Operating switch, high/low capacity	X4 Plug-in contact, boiler
H2 Lamp, high capacity	S3 Control thermostat	X5 Plug-in contact high/low capacity burner
H3 Lamp, lock-out signal 230 V	S4 Temperature limiter	X6 Plug-in contact high/low capacity boiler
M1 Burner motor	S5 Micro switch for hinged door	Y1 Solenoid valve 1
M2 Damper motor	S6 Control thermostat, high/low	Y1S Solenoid valve, safety valv
SQN75.244A21B	S7 Main switch	Y2 Solenoid valve 2
P1 Time meter, low capacity (optional)	T1 Ignition transformer	

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

### 8.2.1 Technical data

	LMO14.113...	LMO24.255...
Preignition 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

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## 8.3 Colour codes LMO14/24

When the burner starts, the light in the reset switch indicates the normal sequence, and also indicates whether something abnormal is happening as per the following table:

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

## 8.4 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.

## 9. Fault Location

### 9.1 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	Check preheater function
Motor does not start	Preheater does not get up to temperature.	

### 9.2 Burner will not start after normal use

Symptom	Causes	Remedies
Burner does not start	Fuse blown	Check and replace fuse as necessary. Investigate cause of fault
	Boiler thermostat has not reset	Adjust thermostat
	Preheater does not get up to temperature	Check preheater function
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
Burner stops	No oil supply	Adjust the burner
	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	Check preheater function
	Preheater temperature too low	Adjust the preheater's set operating temperature
	New oil type	Check that the oil used has the physical parameters that the burner is rated for. If not, change the oil.

## 9.3 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.

## 9.4 Noise in pump

Symptom	Causes	Remedies
The burner pump emits noise during start	Insufficient negative pressure on the suction side pump	Check the oil system in order to reduce pressure drop
The burner pump emits noise during operation		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

## 9.5 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

## 10. Log of flue gas analysis

Owner	Adresss	Tel. no:
Installation		Tel. no:

### Boiler

Type	Make	Power kW
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### Bentone Burner

Type	Model	Serial no.	Fuel
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	Step 1	Step 2	Step 3
Draught in fireplace			
Fan Press mbar			
Filter smoke number			
CO <sub>2</sub>			
O <sub>2</sub>			
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:

# 11. 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 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



## Bentone Oil Burners

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### Type

<b>BF 1</b>	<b>ST 146</b>	<b>B 45</b>	<b>B 80</b>
<b>ST 108</b>	<b>B 2</b>	<b>B 55</b>	
<b>ST 120</b>	<b>B 30</b>	<b>B 65</b>	
<b>ST 133</b>	<b>B 40</b>	<b>B 70</b>	

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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**

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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.

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Additional information can be downloaded at:

**[www.bentone.com](http://www.bentone.com)**

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Ljungby, January 26<sup>th</sup> 2021

Helene Richmond

Managing Director

Enertech AB



