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Installation- and maintenance instruction
B 30 A J/K RME

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exempel example Beispiel

352011030141	Serial no. 1234567	Man.Year 2019
Designation	BF 1 KS 76-24	
Type	BF 1	
Model	BF 1 KS 76-24	
Cap. Min-Max	LIGHT OIL 35-90kW 1,25-6,0 cSt 7-14bar	
Main supply	1~230V 1,0A 50Hz IP 20	
Motor supply		
MADE IN SWEDEN BY		

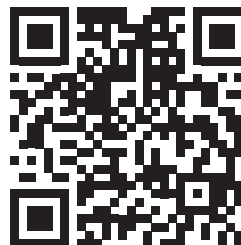


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1. General Information

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.



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 equipment on the burner is, however, of such a quality that it is possible to use EO1 type oil without modification, although with appropriate adjustments to the combustion values after each change of fuel type.

The installation should be done in accordance with applicable standards, general as well as local regulations. The installer of the burner must therefore be aware of regulations regarding oil and combustion.

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.

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 servicing

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.

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.

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

Burner servicing schedule

Service is performed twice a year or after 3000 hours of operation

Burner	2 year	3000 hrs
Filter	2 year change	3000 h Change
Oil hose	1 year change	
Nozzle	2 year change	3000h Change
Electrods	2 Year Change /cleaning	3000h Change /cleaning
Brake plate	2 Year Change /cleaning	3000h Change /cleaning
Motor	2 year	3000 hrs
Cuppling chaft	2 year control/change	3000h control/change
Fan wheel	"2 Year Change when dirty / unbalance"	"3000h Change when dirty / unbalance"
Oil filter	2 year	3000 hrs Change

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	10000 hrs	N/A
Damper motor		500 000 cycles
Contaktor	10 years	500,000 cycles
Gas valve with seal testing	Replacement upon fault detection	N/A
Gas pressure switch	10 years	250,000 cycles
Safety blow-off system	10 years	N/A
Damper motor	N/A	500,000 cycles
Contactora	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

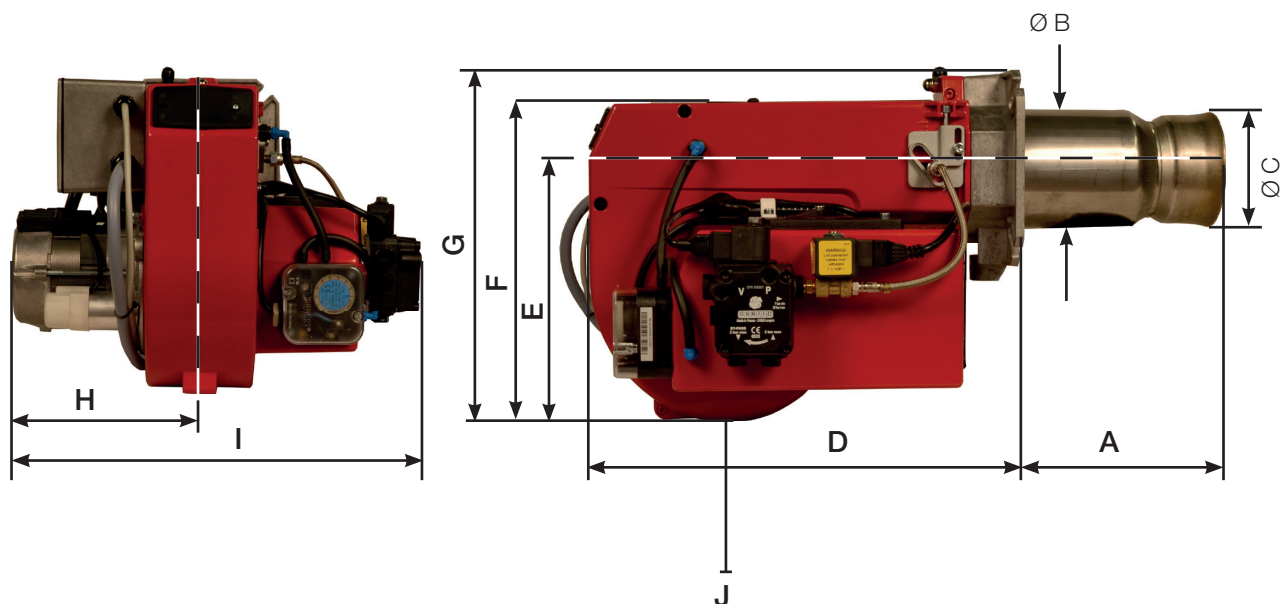
The burner is intended for:

Light oil, B10 heating oil/biofuel blend, (as defined in DIN V51603-6), FAME, B-100 (RME) standard EN 14214 for FAME.

and is used for:

- Water heating generators
- Steam generators
- Industrial applications
- Hot air generators

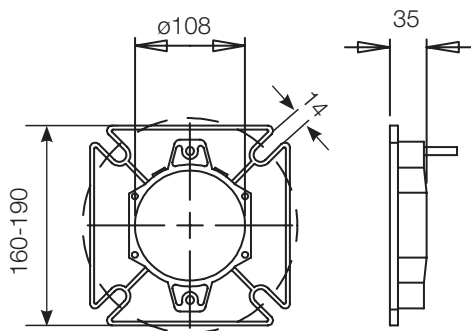
2.1 Dimensions B 30



	A	Ø B	Ø C	D	E	F	G	H	I	* J
B 30	187/315	108	108	372	220	281	303	188	415	200

* Min. recommended distance to floor.

2.2 Dimensions flange

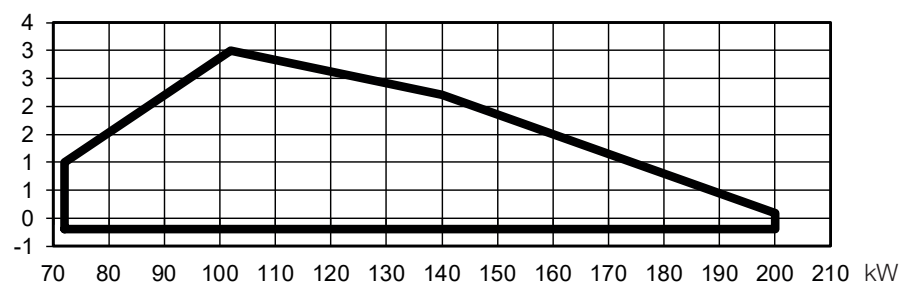


2.3 Working field B 30

6,0-17,0 kg/h

72-200 kW

mbar

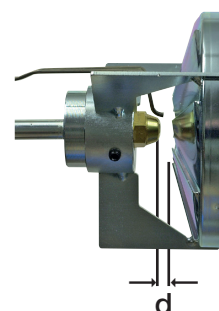
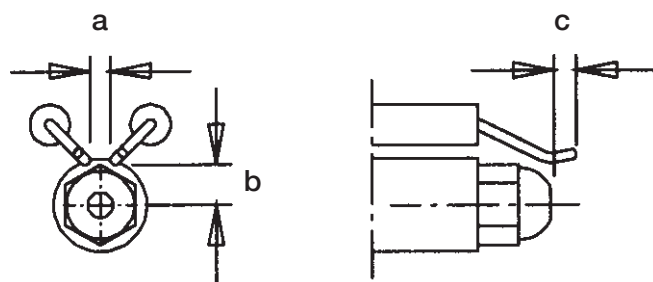


2.3.1 Electric Specification

Burner correspond to IP 40

Type	Motor	Complete burner	Sound
B 30	180W 1,3A 230V 50Hz 5μF	230V 2,6A 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
B30	2.5-3.5	7,0-9,0	1.0-2.0	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.

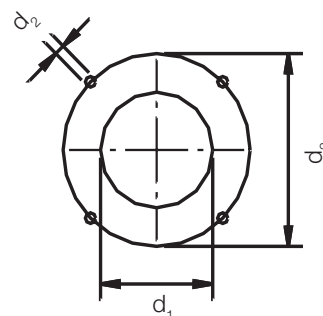
Nozzle:	45° Solid/semisolid
	60° Solid/semisolid
	80° Solid/semisolid
Pump pressure	10 bar (8-25 bar)

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 30	ø 110	M10	ø 160-200





2.7 Nozzle table

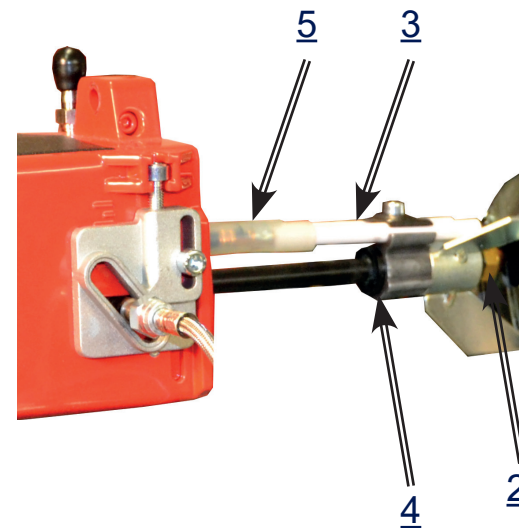
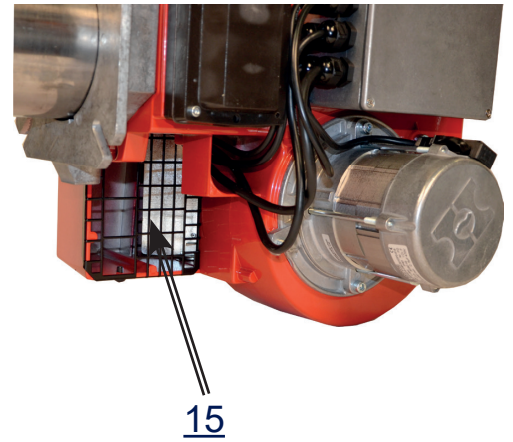
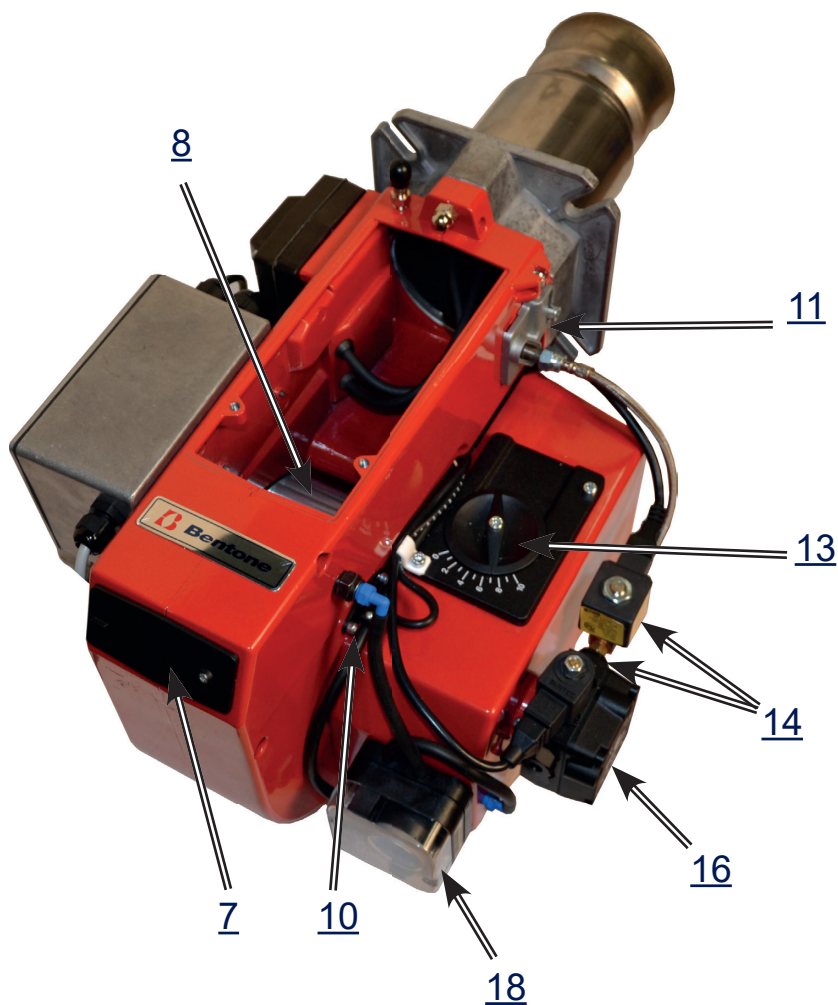
Pump pressure bar 10				11			12			13		
Gph	kg/h	kW	Mcal/h	kg/h	kW	Mcal/h	kg/h	kW	Mcal/h	kg/h	kW	Mcal/h
1,00	3,72	44	38	3,90	46	40	4,08	48	42	4,24	50	43
1,10	4,09	48	42	4,29	51	44	4,48	53	46	4,67	55	48
1,20	4,47	53	46	4,68	55	48	4,89	58	50	5,09	60	52
1,25	4,65	55	47	4,88	58	50	5,10	60	52	5,30	63	54
1,35	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 mm²/s at a density of 830 kg/m³.

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

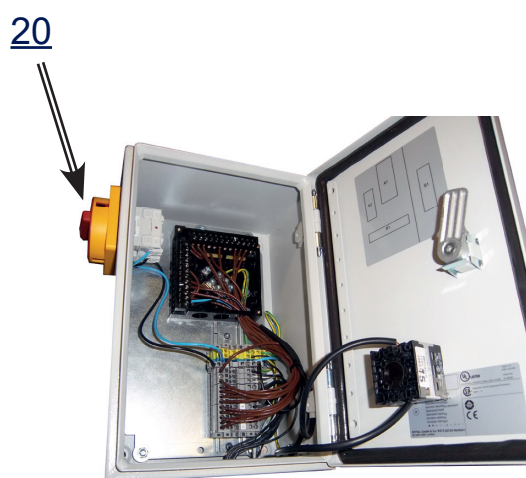
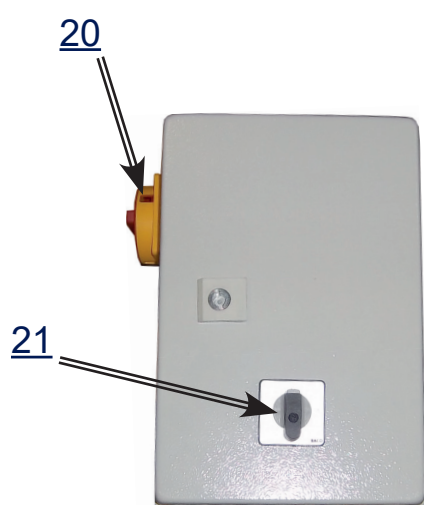
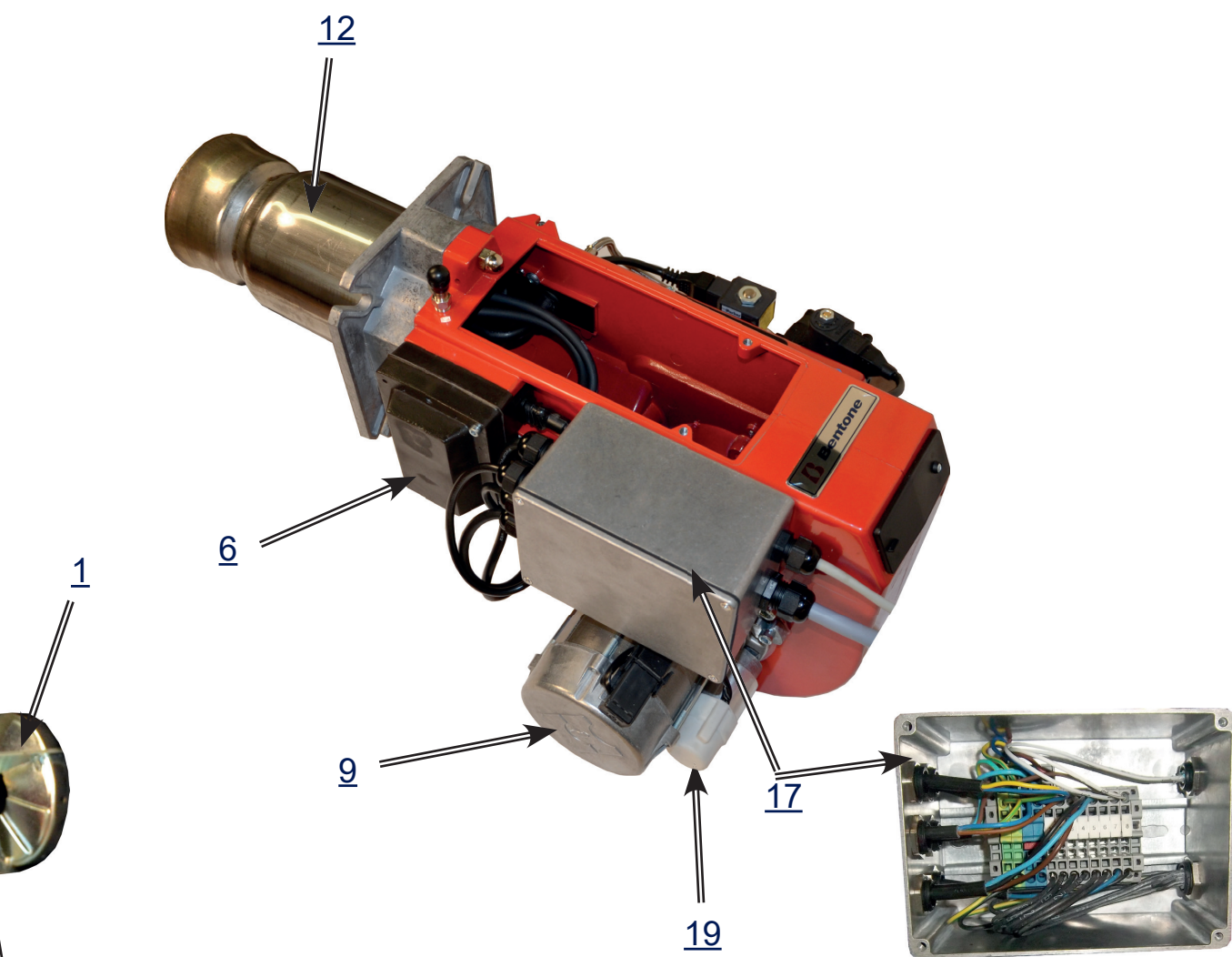
The table applies to oil with a viscosity of 4.4 mm²/s at a density of 830 kg/m³.

2.8 Description



2.7.1 Components

- | | |
|--------------------------------|-------------------------|
| 1. Brake plate | 12. Burner tube |
| 2. Nozzle | 13. Air setting |
| 3. Ignition electrodes | 14. Solenoid valve |
| 4. Nozzle assembly | 15. Air intake |
| 5. Ignition Cable | 16. Pump |
| 6. Ignition transformer | 17. Electric box |
| 7. Inspection glass | 18. Air pressure switch |
| 8. Fan wheel | 19. Capacitor |
| 9. Motor | 20. Disconnecter |
| 10. Photocell | 21. Switch 0-1 |
| 11. Nozzle assembly adjustment | |



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

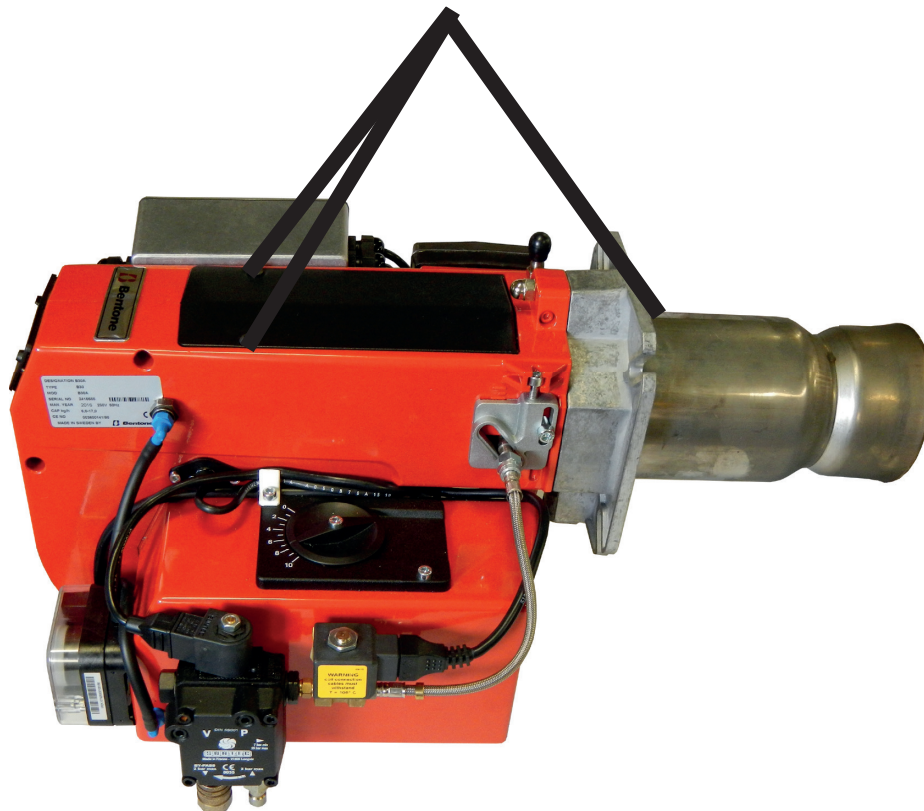
The boiler/burner should be examined regularly for any signs of malfunction or oil leakage. (See service schedule)

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

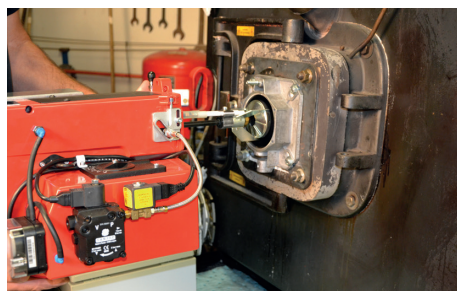
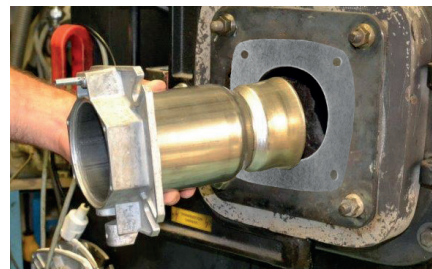
- Before work on the electrical connection, the current should be disconnected so that the installation is isolated.
- Electrical connection must be done in accordance with the applicable regulations.
- Burners should be connected to an isolator switch.
- The connection should be made in accordance with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

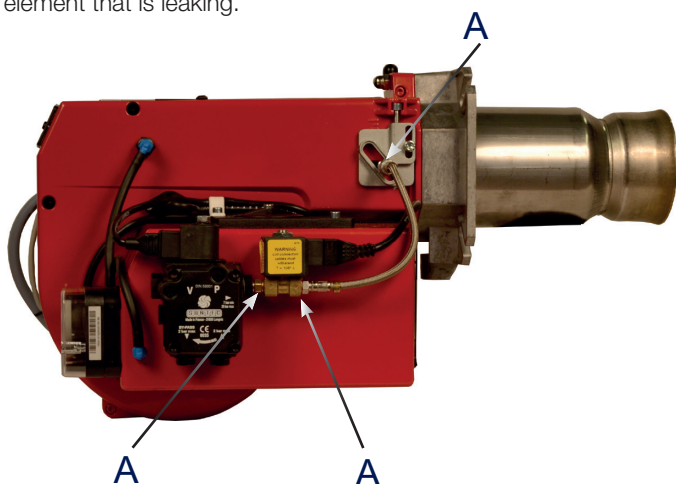
1. Separate the burner body and the flange.
2. Remove the brake disc from the oil pipe.
3. Install the selected nozzle. (See Technical data)
4. Install the brake disc on the oil pipe
5. Remove the burner pipe from the flange.
6. Install the flange with gasket on the boiler.
7. Install the burner pipe 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



4.7 Check oil line seals

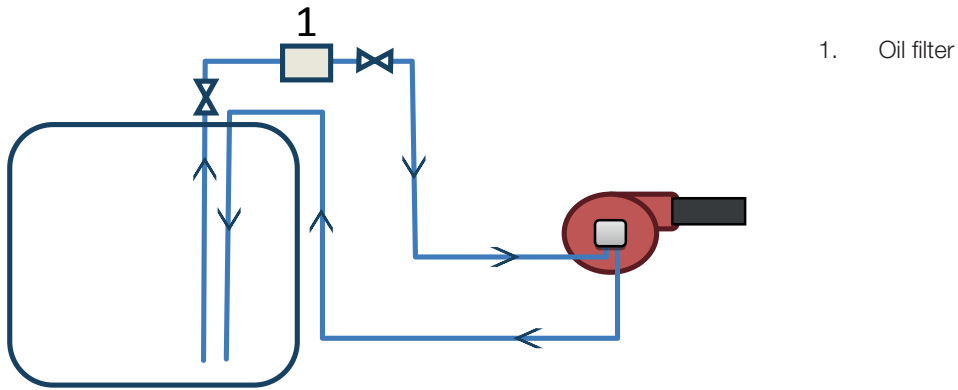
Once the burner has been installed and commissioned, the seals of the various coupling elements should be checked (A).

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

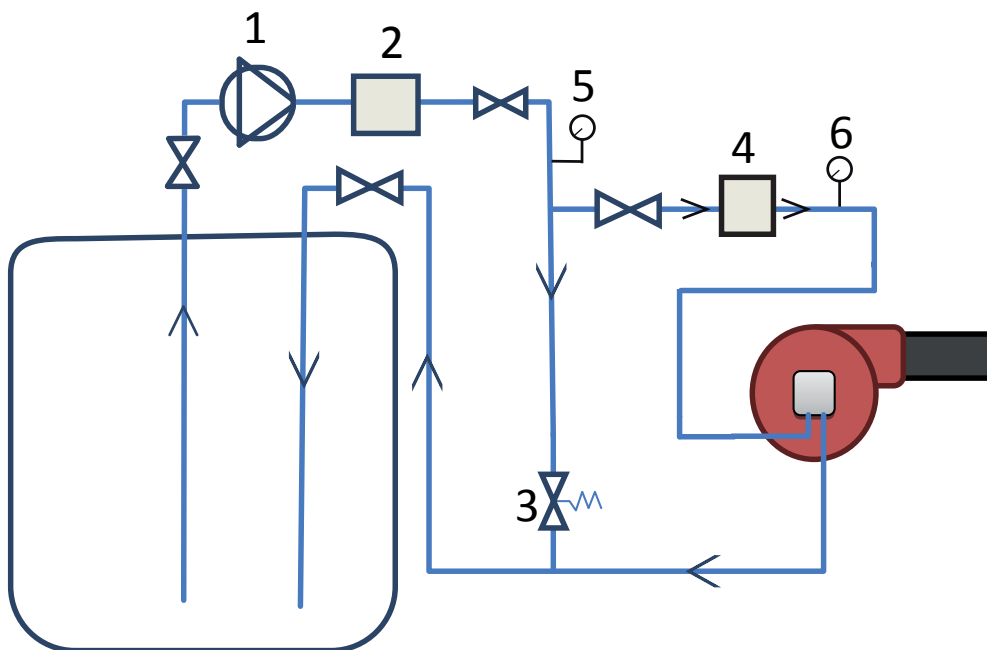


4.7.1 Proposed pipe routing for oil distribution systems without transport pump

This type of connection should be used only when the oil has a viscosity less than $6 \text{ mm}^2/\text{s}$



4.7.2 Proposed pipe routing for oil distribution systems with transport pump



1. Transport oil pump
2. Heavy oil filter
3. Overflow valve 0.5 – 2.0 bar
4. Fine filter
5. Pressure gauge 1
6. Pressure gauge 2

5. Basic settings

5.1 Calculate prepurge time

V =	Fire box size	m ³
Q =	Burner output at prepurge	[kW]
X =	Prepurg time seconds	Water boilers
		100% air rate at least 20s prepurge time
		50 % air rate at least 40s prepurge time
		33% air rate at least 60s prepurge time
X =	Prepurg time seconds	Steam generators at last prepurge 5 times firebox volume
X =	Prepurg time seconds	Industrial heating process at least prepurge at least 5 times firebox and adapted compartments volumes together
Local regulations must be followed		

Calculation example:

Example A: V=2m³ Q=200

Example B: V=9,5m³ Q=500

Example C: V=25m³ Q=2200

$$\text{Example A} \quad X = \frac{V \cdot 5}{((Q \cdot 1,2) / 3600)} = \frac{2 \cdot 5}{((200 \cdot 1,2)/3600)} = 150 \text{ seconds}$$

$$\text{Example B} \quad X = \frac{V \cdot 5}{((Q \cdot 1,2) / 3600)} = \frac{9,5 \cdot 5}{((500 \cdot 1,2)/3600)} = 285 \text{ seconds}$$

$$\text{Example C} \quad X = \frac{V \cdot 5}{((Q \cdot 1,2) / 3600)} = \frac{25 \cdot 5}{((2200 \cdot 1,2)/3600)} = 170 \text{ seconds}$$

5.2 Examples of basic setting B30

Burner output	200 kW
Estimated nozzle output	$200 \text{ kW} / 11,86 \text{ kWh/kg}^* = 16,9 \text{ kg/h}$

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 bar
Nozzle	4,50 gph
Power in	$16,75 \text{ kg/h} \Rightarrow 16,75 \text{ kg/h} \times 11,86 \text{ kWh/kg} = 198 \text{ kW}$

Basic settings

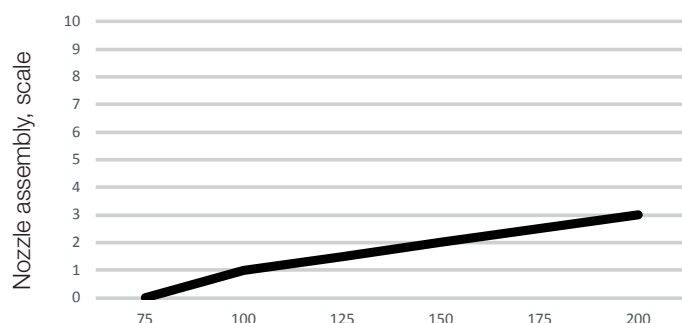
The setting value for 200 kW in accordance with basic setting tables. For the correct procedure when implementing settings, see 5.3 Nozzle assembly control, brake plate B30 and 5.4 Air setting B30 (See technical data)

Effects and nozzle selection from example

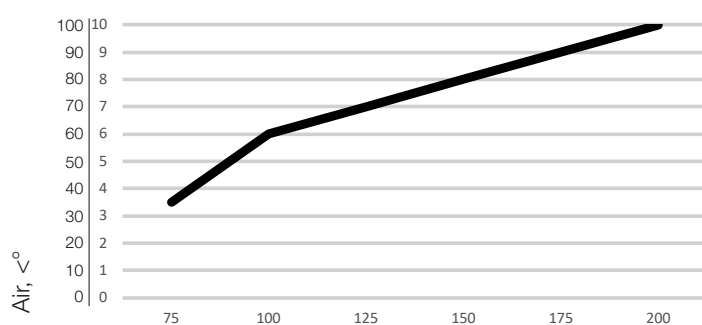
Nozzle assembly	1
Damper	6

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.

5.3 Setting values for nozzle assembly B 30



5.4 Setting values for air damper B 30



Setting of brake disc and air flow

Prior to commissioning, the default settings of the burner can be set in accordance with the diagram. See under Default settings. **Note that it is simply a matter of a default 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.

Recommended moisture content

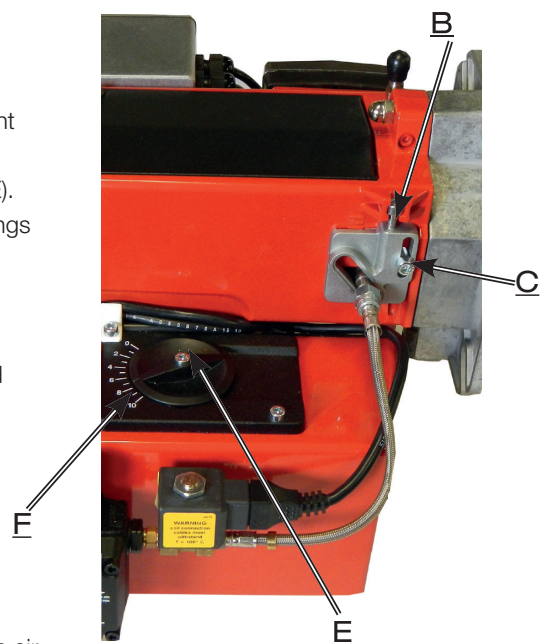
Grade of Oil	Excess air flue gases		Max. % CO ₂
	% O ₂	% CO ₂ Lambda 1.2	
Light oil, B10 heating oil/ biofuel blend (as defined in DIN V51603-6)	3–5	≈12,5	15,4

5.5 Nozzle assembly adjustment, brake plate

The nozzle assembly control is used to achieve the most favourable pressure drop across the brake plate as possible at the various effect stages. The nozzle assembly is adjusted manually (B) in order to obtain the optimum pressure drop for good combustion.

5.6 Air setting

Set the operations switch (S1) on the on position (I). Loosen the screw (E) that locks the air adjustment knob. Adjust the position of the air damper using the wheel until the desired air flow is achieved. Clockwise adjustment reduces the amount of air, whilst an anticlockwise adjustment increases the air flow. After adjustment, lock the damper position using the screw (E). Damper position can be read on the damper scale (F). Check the air settings by conducting a flue gas analysis..



5.7 Setting the air pressure switch

The air pressure switch should block the burner if the air quantity supplied for combustion is insufficient. The air pressure switch must be set so that, if there is a defective air supply at the burner's max. or min. capacity, it reacts before the monitored pressure falls so much that it results in poor combustion.

1. Remove the protective cover, screw (Y).
2. Start the burner.
3. Carefully turn the scale on the air pressure switch clockwise until the air pressure switch stops the burner. **Is the tolerance on the scale for the min. air pressure switch approx. $\pm 15\%$?**
4. Try to find the pressure at which the burner stops for both the minimum and maximum input power by turning the scale. Make a note of the values and then set the air pressure switch on the basis of the highest pressure noted at which the burner stopped.
5. The air pressure switch should be set to a pressure approx. 10–15% lower than the highest noted pressure at which the burner stopped.
6. After setting the air pressure switch, perform repeated starts and run through the burner's set output range several times. This is to ensure the reliable function of the burner. If breakdowns or interruptions occur, the air pressure switch is probably set to a too narrow position.
7. Fit the protective cover, screw (Y).



Setting area approx.:	Type	Max. pressure
1-10 mbar	LGW 10 A2	500 mbar
2,5-50 mbar	LGW 50	500 mbar

6. Burner servicing

6.1 Servicing the combustion assembly

Removal and installation

1. Switch off the main power.
2. Loosen the nut (G) and remove the burner body from the burner flange.



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

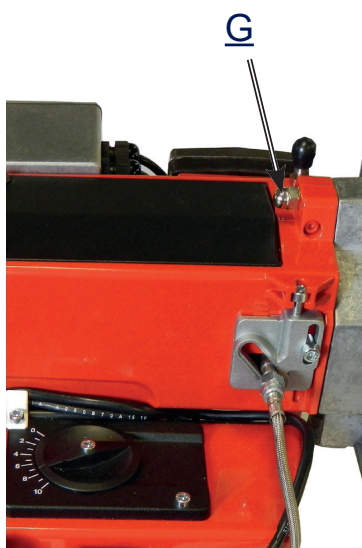
3. Remove the brake plate from the oil pipe and clean the brake plate.
4. Unscrew the nozzle/nozzles.
5. Install new nozzle/nozzles.
6. Install the brake plate. (see technical data)
7. Check the ignition electrodes. (see technical data)
8. If necessary, replace the ignition electrodes.
9. Fit the burner 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.
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.



Note:

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

165 205 97

6.2 Servicing air dampers

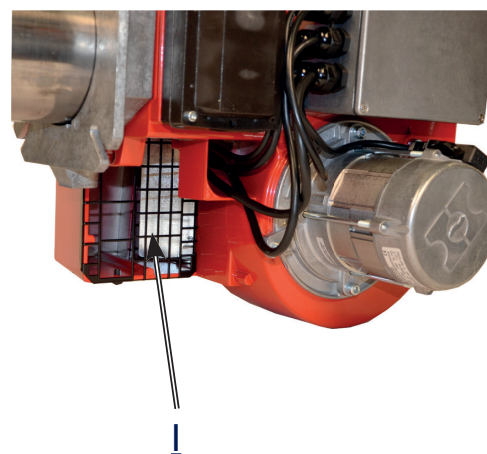
Removal and installation

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. Note the position of the air damper and loosen the air damper locking screw.
4. Clean the air damper (I) and the intake. Lubricate any damper shaft.
5. Adjust the air damper and its position.
6. Fit the burner body and the burner flange together and secure with the nut (G).
7. Fit the grille and turn on the mains power.
8. Check combustion*



Note:

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

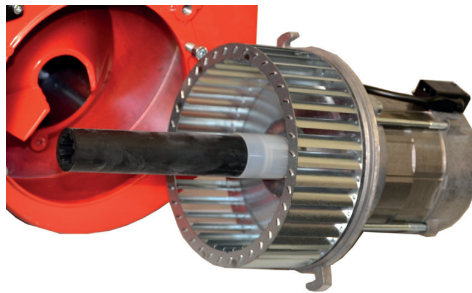
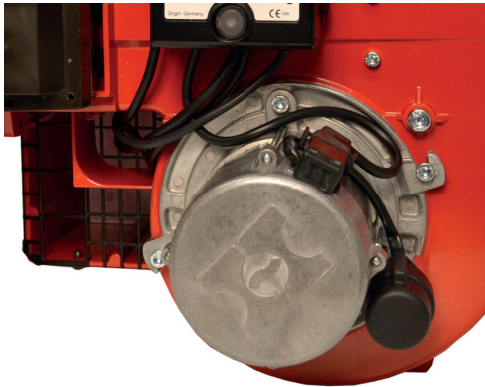
6.3 Servicing the fan

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



6.3.1 Replacing the drive shaft

Removal and installation

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

6.4 Replacing the oil pump

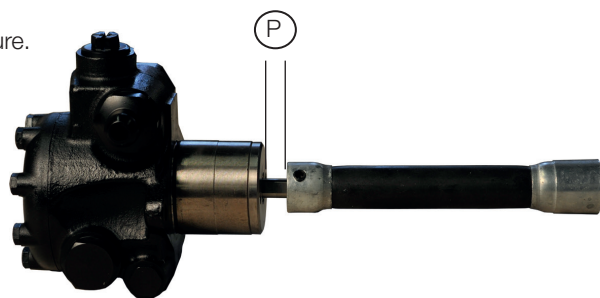
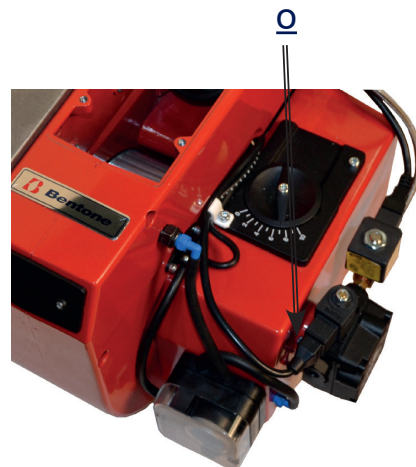
Removal and installation

1. Switch off the mains power.



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

2. Remove the oil hoses from the pump.
3. Loosen the screws (O) and pull out the oil pump.
4. Move the pump coupling to the new pump and set the same distance between the pump and the pump coupling as before (K) in order to avoid pressure on the pump seal.
5. Install the oil pump on the burner and tighten the screws (O). (It is important that the pump shaft splines align correctly in the pump coupling)
6. Fit the oil hoses
7. Turn on the mains power..
8. Bleed the pump, start the burner and set the correct oil pressure.
9. Check combustion.*



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



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

Note:

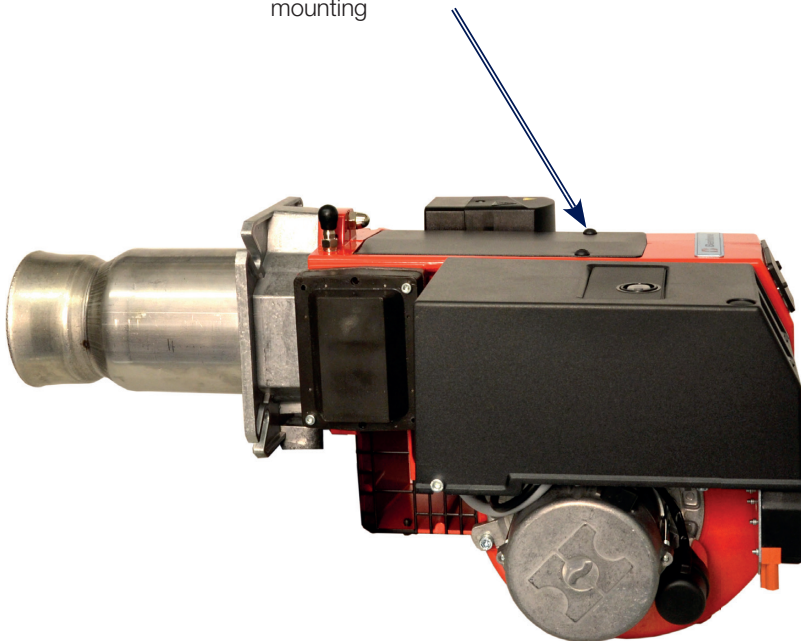
- * When servicing/replacing components that affect combustion, an analysis and soot test shall be carried out on the installation.

6.5 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

Use lid screw
hole for sensor
mounting



7. Instructions Pump

7.1 SUNTEC D(V) 57C

Technical data

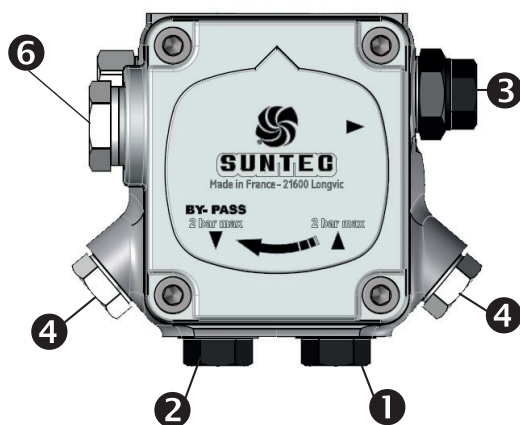
One or two-pipe system.

Viscosity range: 2 - 75 mm²/s mm²/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

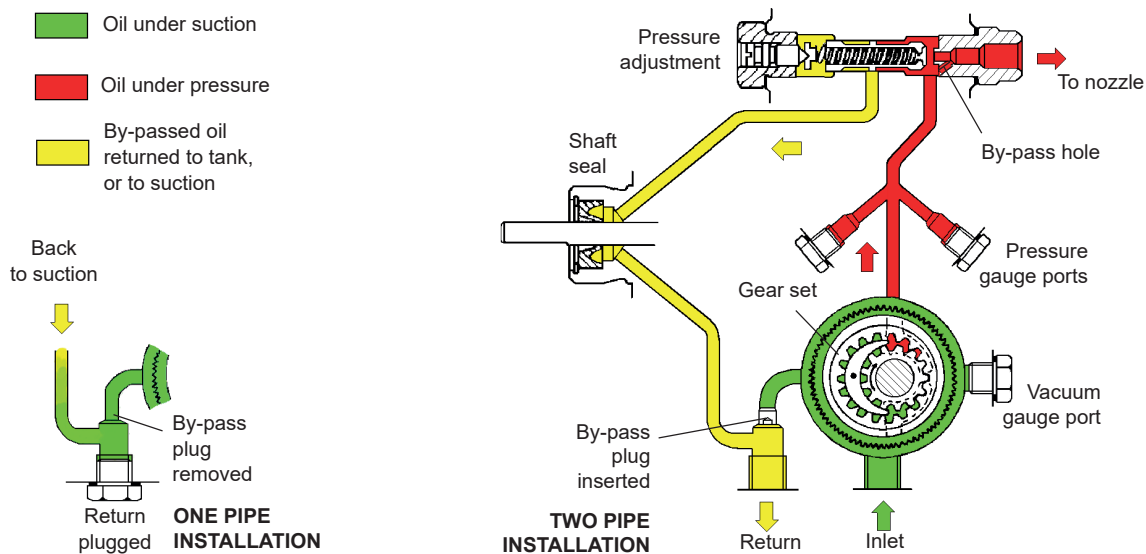
Bleeding in two pipe operation is automatic. In one pipe operation, during the starting period, air is purged through the nozzle line : the by-pass hole of the nozzle plug allows air to pass to the nozzle line without opening of the regulator valve.

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.



7.1.1 Suction line tables

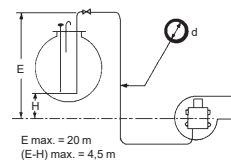
7.1.1.1 Overlying tank

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

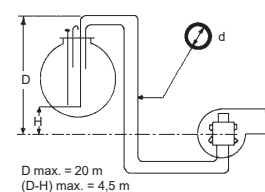


Two-pipe system

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



7.1.1.2 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

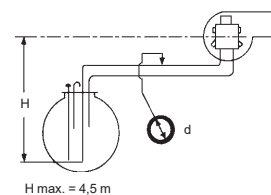
The suction line tables consist of theoretically calculated values where the pipe dimensions and oil velocity have been matched so that tur-bulences will not occur. Such tur-bulences will result in increased pressure losses and in acoustic noise in the pipe system. In addition to drawn copper piping 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



7.1.3 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.

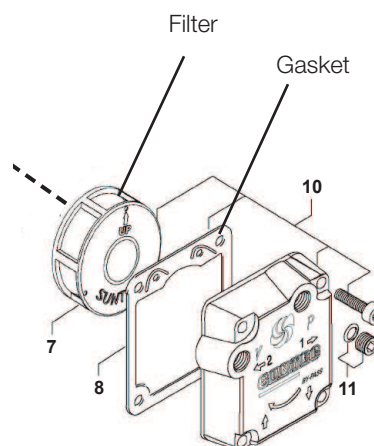


When servicing oil bearing components, check for oil leakage when the burner is commissioned after servicing.

7.1.2 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



Note:

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

7.1.4 Replacing the gasket seal (pump)

Removal and installation

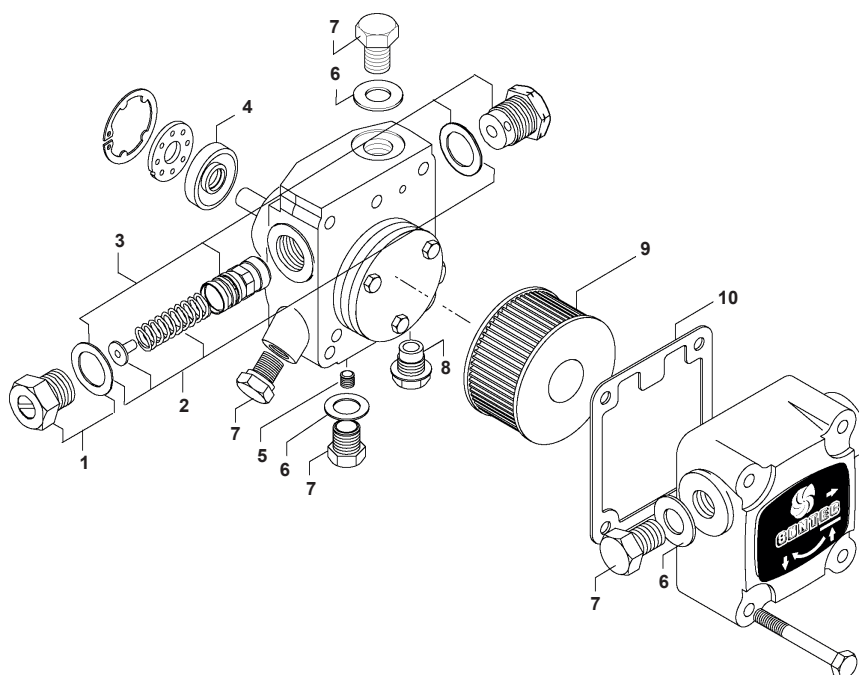
1. Disconnect hoses, oil pipes, and electrical cables



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



8. Replacement of electrical components

1. Switch off the mains power.
2. Note the connection of the existing component.



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

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 mains power.
6. Check the function of the new component.
7. Start the burner. Check combustion.*

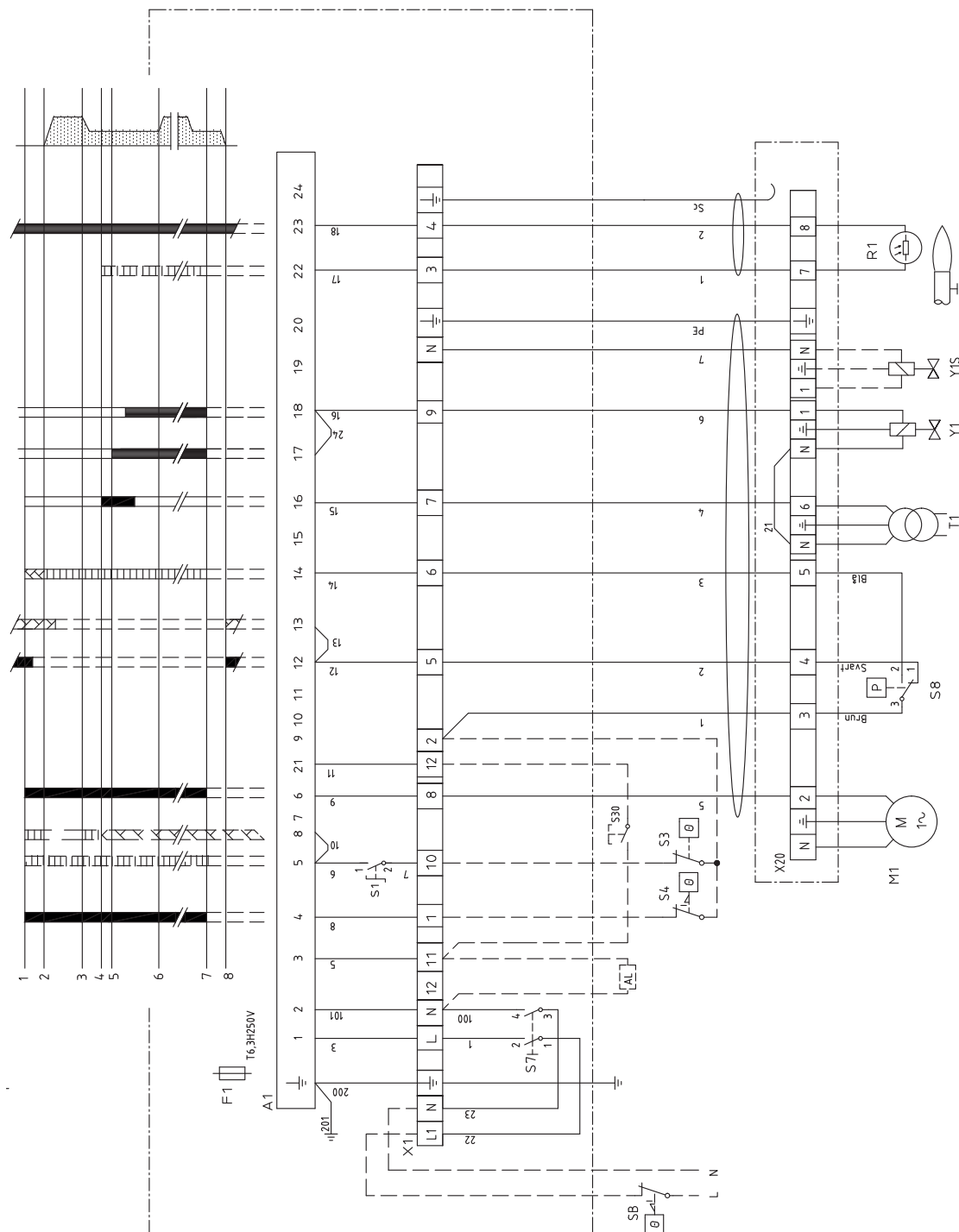
Note:

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

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9. Electrical equipment

9.1 Wiring diagram



9.2 Component.

A1	Burner control	S30	External reset
F1	Operating fuse	T1	Ignition transformer
M1	Burner motor	X1	Connection block
R1	Flame detector	X20	Connection terminal board
S1	Operating switch	Y1	Solenoid valve
S3	Rules/Operating thermostat	Y1S	Safety solenoid valve
S4	Temperature/pressure limiter		
S7	Main switch		
S8	Air pressure switch		

10. Control








10.1 Technical data

	BP230UVFR-S2	BP230UVFR-S3
Pre-purge time (t1)	30.7 s	37.2 s
Pre-ignition time (t3)	6 s	2.5 s
Safety time (TSA)	3 s	5 s
Post-purge time (t6)	16.8 s	14.9 s
Reaction time for low interrupt	1 s	1 s
Ambient temperature BP	-40 to +60 °C	-40 to +60 °C
Ambient temperature UV5	-20 to +60 °C	-20 to +60 °C
Max. current, terminals 6-7	2 A	2 A
Max. current, other terminals	1 A	1 A
Ionisation current	3-10 µA	–

10.2 LED indicator lamps

BurnerPRO's burner control has seven LEDs which indicate the operating status of the control unit and the cause of the lockouts.

Each LED has an icon describing its function.

	FAN	Lights up when voltage is supplied to the fan motor (terminal 6)
	OPEN DAMPER 6	Flashes when the damper motor runs to maximum position. When the switch for the maximum damper motor position closes, this LED will light continuously.
	CLOSE DAMPER 5	Flashes when the damper motor runs to minimum position. When the switch for the minimum damper motor position closes, this LED will light continuously.
	AUTO 4	Lights up when the Burner control is in normal operating mode.
	IGNITION 3	Indicates ignition
	FLAME 2	Lights up when a flame is detected by the flame detector.
	ALARM/STATUS	In lockout mode, the Alarm lamp lights up and the other LEDs light up to indicate lockout. Refer to "Fault codes".

The LEDs can show the flame strength in Control mode by pressing the reset button for 3 seconds when the Flame LED flashes during start-up. In Control mode, the Status LED shines yellow, the Fan LED flashes, and LEDs 2-6 show the flame signal strength. Each LED corresponds to 20% of the total flame signal. 5 lit LEDs correspond to 100% and 2 LEDs correspond to 40%.








10.3 Explanation of the different sequence modes

1. **Operation**
This is the control unit voltage supply.
2. **System test**
In this status mode, the control unit undergoes an internal test to verify correct functionality of the hardware and software.
3. **Preconditions for burner start-up**
The control unit verifies that the air pressure switch is in the depressurised position and a test of the fuel cut-off valve is carried out.
4. **Heating requirement**
The operating thermostat closes and voltage is supplied to connection 5 so that the control unit can start the burner.
5. **Pre-purge begins**
The control unit starts the fan. Connections 6 and 7.
6. **Damper motor opens**
Control unit connection 9 sends a command to the damper motor to run at Max. mode. The control unit detects that the damper motor's end position switch indicates successful transition to the Max. load mode by supplying voltage to the connection 8 input. The control unit also performs a test to ensure that the air sensor detects airflow by monitoring connection 14.
7. **Pre-purge**
The combustion chamber is ventilated.
8. **Damper motor closes**
Following pre-purge, the control unit closes connection 10. The control unit detects that the damper motor is in the Low Load mode by supplying voltage to connection 8 on the control unit.
9. **Ignition on**
The control unit supplies voltage to the ignition transformer by activating connection 16.
10. **Fuel on** The control unit activates the fuel valve by supplying voltage to connections 17 and 18 as well as to direct ignition systems.
11. **Flame indication**
Ignition transformer turns off. The flame signal is tested during this stage. If no flame is detected, the burner enters Lockout mode.
12. **Operating mode**
Once a flame is stable, the control unit transitions to Operating mode. There must be a flame signal. Voltage is supplied to connection 20.
13. **Shutdown**
Shutdown occurs when the heating requirement is met and power is cut off to the operating thermostat connection 5 . The control unit closes the fuel valves by cutting off power to outputs 18 and 20. The fan post-purges the combustion chamber.
14. **Lockout**
The control unit enters lockout mode when an internal or external fault is detected. The reset button and the remote-reset connection can be used to disable Lock mode. However, the control unit will revert to lockout mode if the fault is not rectified.

Burner Lockout

When lockout occurs, the LEDs indicate the cause. The control unit status is saved in the memory, even in the event of a power outage. By pressing the manual reset button on the control unit or remote reset.

10.4 BurnerPro LED fault/lock code table

NO.	FAULT	LED 1	LED 2	LED 3	LED 4	LED 5	LED 6	LED 7	POSSIBLE SOLUTION
	OPERATION LED ● = ON	Fan	Open damper	Closed damper	Auto	Ignition	Flame	Status	
	ICON								
1	DIAGNOSTIC ERROR, MAIN MCU INLET	●						RED	Initial diagnostic error. Ensure correct status of inputs and outputs when the unit is turned on.
2	LOCAL RESET		●					RED	User-initiated manual reset/lockout or defective reset switch.
3	AIR SENSOR	●	●					RED	Air sensor signal [connection 14] could not be detected by the end of the safety time, or loss of the air sensor signal during burner operation
4	DIAGNOSTIC ERROR			●				RED	"The system detected voltage at terminal 16, 17, 18, or 19 at the incorrect time, or no voltage detected when necessary. Check cabling and makes sure the system is running on a single line phase (50/60Hz)"
5	IONISATION FLAME LOSS	●		●				RED	Flame loss. Inspect the system, check the gas pressure, flame detector, cabling, etc.
6	IONISATION CIRCUIT FAULT		●	●				RED	Replace the control unit. Contact reseller/distributor.
7	INTERNAL COMMUNICATION ERROR	●	●	●				RED	Reset the system to continue normal operation. Contact reseller/distributor if the fault persists.
8	REMOTE RESET				●			RED	The user has pressed Remote Reset or the remote controller has short-circuited.
9	IONISATION FAULT	●			●			RED	Replace the control unit. Contact reseller/distributor.
10	MAIN PROGRAM SEQUENCE ERROR		●		●			RED	Replace the control unit. Contact reseller/distributor.
11	RAM TEST	●	●		●			RED	Replace the control unit. Contact reseller/distributor.
12	PROGRAM SEQUENCE ERROR			●	●			RED	Replace the control unit. Contact reseller/distributor.
13	READING ERROR INPUT	●		●	●			RED	Check cabling and makes sure the system is running on a single phase (50/60Hz)
14	TIMER2 ERROR		●	●	●			RED	Replace the control unit. Contact reseller/distributor.
15	CPU TEST FAILED	●	●	●	●			RED	Replace the control unit. Contact reseller/distributor.
16	FLAME LOSS	●				●		RED	Visually inspect the flame detector and confirm that the pilot light was lit during start-up. Check the fuel supply system.
17	CABLE FAULT		●			●		RED	The system detected voltage at terminal 16, 17, 18, or 19 at the incorrect time, or no voltage detected when necessary. Check cabling and makes sure the system is running on a single phase (50/60Hz)
18	SAFETY RELAY FAULT	●	●			●		RED	Replace the control unit. Contact reseller/distributor
19	FUEL VALVE OPEN			●		●		RED	Check fuel valve cabling. The valves may not be fully closed.

NO.	FAULT	LED 1	LED 2	LED 3	LED 4	LED 5	LED 6	LED 7	POSSIBLE SOLUTION
20	FLAME LOSS	●		●		●		RED	Visually inspect the flame detector and confirm that the main flame was lit during start-up. Check the fuel supply system.
21	WELDED SAFETY RELAY		●	●		●		RED	Replace the control unit. Contact reseller/distributor.
22	SELF TEST	●	●	●		●		RED	Replace the control unit. Contact reseller/distributor.
23	ROM ERROR				●	●		RED	Replace the control unit. Contact reseller/distributor.
24	FLAME LOSS DURING OPERATION	●			●	●		RED	Check the cabling. Check the flame detector. Check the fuel supply system.
25	RAM ERROR		●		●	●		RED	Replace the control unit. Contact reseller/distributor.
26	INTERNAL FAULT	●	●		●	●		RED	Replace the control unit. Contact reseller/distributor.
27	NOT USED								
28	NOT USED								
29	AMBIENT TEMPERATURE		●	●	●	●		RED	Ambient temperature below -40 °C or above 70 °C
30	ROM ERROR	●	●	●	●	●		RED	Replace the control unit. Contact reseller/distributor.
31	IONISATION SHORT-CIRCUIT						●	RED	Possible external short-circuit between terminals 23 and 24. Contact reseller/distributor if the fault persists.
32	TIME LIMIT EXCEEDED FOR CONTROL MODE	●					●	RED	30-minute activation time passed.
33	STANDBY FALSE FLAME		●					RED	False flame detected in Standby mode.
34	NOT USED							RED	
35	INTERNAL RESET			●			●	RED	Internal software reset of control unit. Contact reseller/distributor if the fault persists.
36	SOFTWARE RESET	●		●			●	RED	Internal software reset of control unit. Contact reseller/distributor if the fault persists.
37	WAITING TIME INPUTS		●	●			●	RED	The system was unable to perform airflow sensor test and/or valve closure test. Check the cabling. Check the air sensor and/or fuel valve switch.
38	INTERNAL RESET	●	●	●			●	RED	Internal software reset of control unit. Contact reseller/distributor if the fault persists.
39	SOFTWARE RESET				●		●	RED	Internal software reset of control unit. Contact reseller/distributor if the fault persists.
40	HARDWARE RESET	●			●		●	RED	Replace the control unit. Contact reseller/distributor if the fault persists.
41	HARDWARE RESET		●		●		●	RED	Replace the control unit. Contact reseller/distributor if the fault persists.
42	CONTROL PROGRAM FROZEN	●	●		●		●	RED	Replace the control unit. Contact the distributor/factory.
43	CONTROL PROGRAM FROZEN			●	●		●	RED	Replace the control unit. Contact reseller/distributor.
44	TIMER2 ERROR	●		●	●		●	RED	Replace the control unit. Contact reseller/distributor.
45	LOW VOLTAGE ERROR		●	●	●		●	RED	Check mains power. Contact reseller/distributor if the fault persists.
46	LOW VOLTAGE ERROR	●	●	●	●		●	RED	Check mains power. Contact reseller/distributor if the fault persists.
47	UV DETECTION FAULTY					●	●	RED	Replace the control unit. Contact reseller/distributor.

NO.	FAULT	LED 1	LED 2	LED 3	LED 4	LED 5	LED 6	LED 7	POSSIBLE SOLUTION
48	INTERNAL FAULT	●				●	●	RED	Replace the control unit. Contact reseller/distributor.
49	INTERNAL FAULT		●			●	●	RED	Replace the control unit. Contact reseller/distributor.
50	IGNITION FEEDBACK	●	●			●	●	RED	The system detected voltage at terminal 16 at the incorrect time, or no voltage. Check cabling and ensure sufficient earthing.
51	PILOT FEEDBACK			●		●	●	RED	The system detected voltage at terminal 17 at the incorrect time, or no voltage. Check cabling and ensure sufficient earthing.
52	MAINP FEEDBACK	●		●		●	●	RED	The system detected voltage at terminal 19 at the incorrect time, or no voltage. Check cabling and ensure sufficient earthing.
53	WAITING TIME FEEDBACK LIMIT EXCEEDED		●	●		●	●	RED	Loss of feedback from the damper motor for more than 10 minutes. Check the cabling. Check the damper motor.
54	MAIND FEEDBACK	●	●	●		●	●	RED	The system detected voltage at terminal 18 at the incorrect time, or no voltage. Check cabling and ensure sufficient earthing.
55	DIAGNOSTICS INTERRUPTED				●	●	●	RED	Replace the control unit. Contact reseller/distributor.
56	UV FALSE FLAME			●	●	●	●	RED	False flame detected prior to ignition. Check the cabling. Check the flame detector. Ensure sufficient earthing.
57	IONISATION FALSE FLAME			●	●	●	●	RED	False flame detected prior to ignition. Check the cabling. Check the flame detector. Ensure sufficient earthing.
58	OPEN FEEDBACK READING		●	●	●	●	●	RED	The system detected voltage at terminal 8 at the incorrect time, or no voltage. Check cabling and ensure sufficient earthing.
59	ADJACENT POLE SHORT-CIRCUIT	●			●	●	●	RED	Replace the control unit. Contact reseller/distributor.
60	LOCAL RESET	●	●	●	●	●	●	RED	The local reset button has been pressed in for more than 10 seconds, or the reset button is stuck.
61	FUEL VALVE OPEN		●		●	●	●	RED	Fuel valve open at incorrect time.
62	STRONG UV FLAME	●	●		●	●	●	RED	Flame detector too close to the flame. Increase the distance between the flame detector and the flame.
63	INTERNAL FAULT					●		RED	Replace the control unit. Contact reseller/distributor.

11. Fault Location

11.1 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)
	Defective oil burner control	Check the oil supply to the burner and that there are no air bubbles in the pump
Motor starts	No oil	Check function of solenoid
Burner pre-ventilates	False light	Check flame monitor does not register ambient light
No flame formed	No spark	Check high voltage wiring and ignition electrodes
Burner trips		Check preheater function
Motor does not start	Preheater does not get up to temperature.	

11.2 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	
	Preheater temperature too low	Check preheater function
	New oil type	Adjust the preheater's set operating temperature
		Check that the oil used has the physical parameters that the burner is rated for. If not, change the oil.

11.3 Delayed ignition

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

11.4 Noise in pump

Indications	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

11.5 Pump pressure

Indications	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
		Replace pump and install self-cleaning filter in the oil system
	Pump run using impure oil that has worn the pump out prematurely	Check, clean pump filter
	Blocked pump filter	

12. 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:

13. 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.

Installed by:

.....

Tel:

If the burner starts but does not ignite

Make an attempt to start the burner.

Never make close repeated start attempts.

Don't restart the burner until the boiler is free from oil gases.

If the burner still does not ignite send for the service engineer.

When switching off during summer

Always use the main switch to cut out the burner even when adjusting the burner or cutting off the heating for a short time. For longer periods of shut down, close all valves and the oil supply stop-cock.

Clean the filter and nozzle by washing in petrol or paraffin.

Make sure the filter medium is not damaged or defective.

Protect electrical gear from damp.

Warning

Never stand too near or put your face to the inspection or fire door, when the burner is about to start.

Never use a naked flame to ignite oil if the electrical ignition fails.

Always wait for about 10 minutes for the unburnt gases to disperse before restarting the oil burner if it has failed to ignite previously.

EU Declaration of conformity



Bentone Oilburners

Type

BF 1 B 55

ST 146 B 65

B 30 B 70

B 40 B 80

B 45

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 (Fulfiels the requirements of Annex J/K) Automatic forced draught burners for liquid fuels

Additional information can be downloaded at:

www.bentone.com

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Ljungby September 26th, 2017

Håkan Lennartsson

Managing Director

Enertech AB

