CR00349 178 122 52-3 2021-08-06

Installation- and maintenance instruction

B 30 2A

LMO24.255C2E

AT2 45C

Translation of the original instructions.

Bentone®

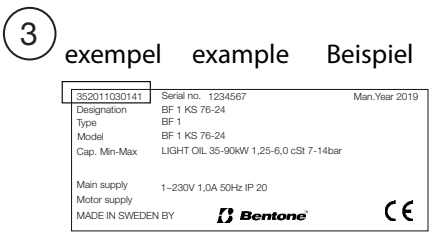

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Table of contents

1. Safety Information

This Installation and Maintenance manual:

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

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

Burner servicing schedule

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

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

Component replacement intervals

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

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

Delivery check

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

2. Technical data

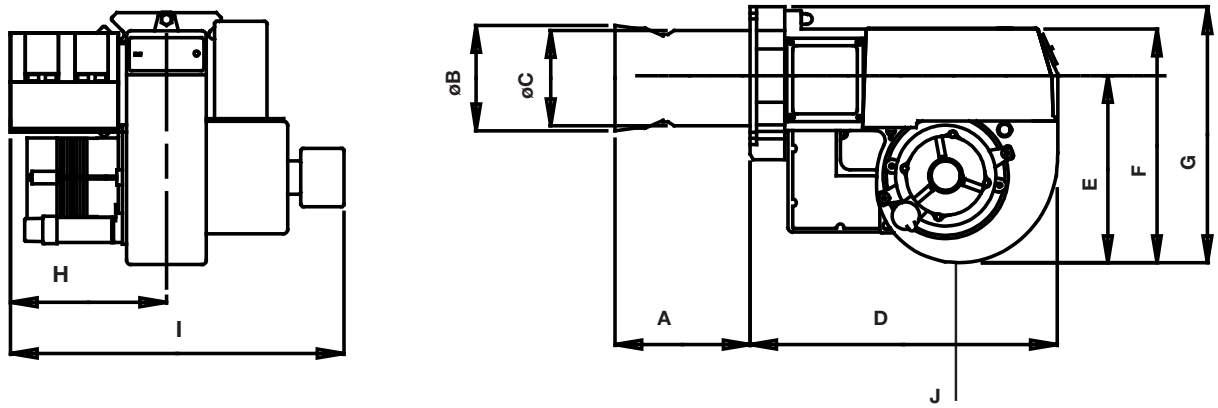
The burner is intended for:

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

and is used for:

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

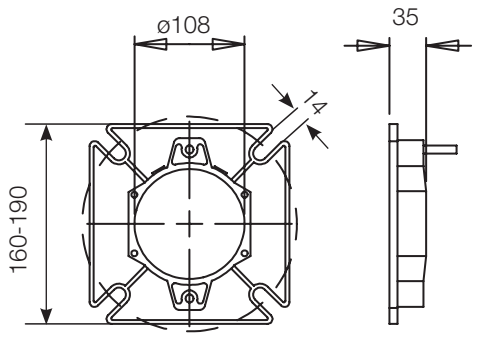
2.1 Dimensions B 30 2A



	A	Ø B	Ø C	D	E	F	G	H	I	* J
B 30 2A	174/315	108	108	372	220	281	303	188	395	200

* Min. recommended distance to floor.

2.1.1 Dimensions flange



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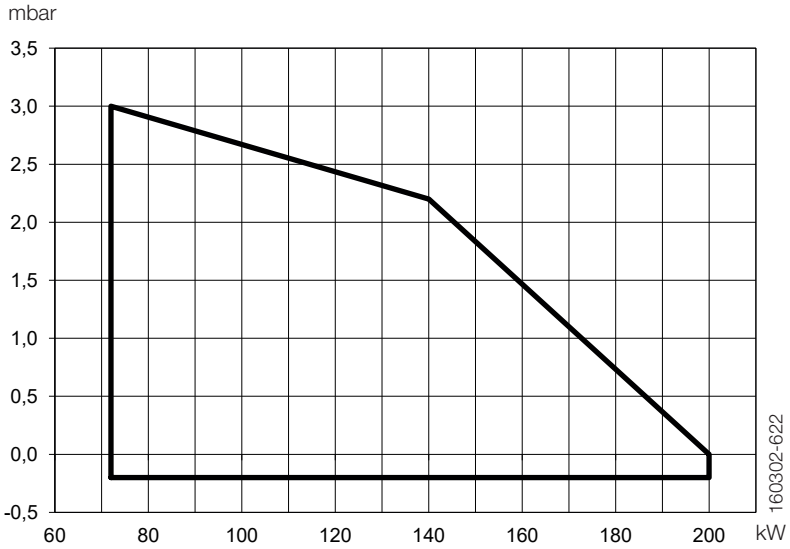
2.2 Working field B 30 2A

6.0-17.0 kg/h
72-200 kW



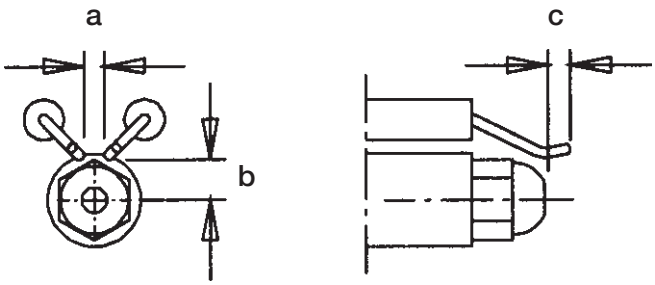
2.3 Electric Specification

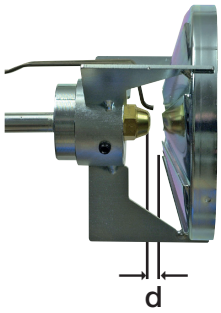
Burner correspond to IP 20

Type	Motor	Complete burner	Sound
B 30 2A	250W, 1.8A, 230V, 60Hz, 8µF	230V, 3.1A, 60Hz	84 dBA ± 0,5 dBA

Max burner supply, see data plate.

2.4 Setting of brake plate and air flow





	a	b	c	d
B 30 2A	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.

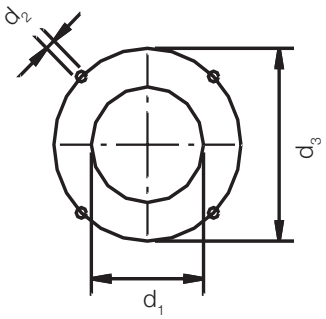
Nozzle:	45° Solid/semisolid
	60° Solid/semisolid
	80° Solid/semisolid
Pump pressure	10 bar (8-25 bar)

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 2A	ø 110	M10	ø 160-200



2.7 Nozzle table

Pump pressure bar

Gph	9			11			13			15		
	kg/h	kW	Mcal/h	kg/h	kW	Mcal/h	kg/h	kW	Mcal/h	kg/h	kW	Mcal/h
0,85	3,00	36	31	3,32	39	34	3,61	43	37	3,87	46	39
1,00	3,53	42	36	3,90	46	40	4,24	50	43	4,56	54	46
1,10	3,88	46	39	4,29	51	44	4,67	55	48	5,01	59	51
1,20	4,24	50	43	4,68	55	48	5,09	60	52	5,47	65	56
1,25	4,40	52	45	4,88	58	50	5,30	63	54	5,70	68	58
1,35	4,76	56	48	5,27	62	54	5,73	68	58	6,15	73	63
1,50	5,29	63	54	5,85	69	60	6,36	75	65	6,83	81	70
1,65	5,82	69	59	6,44	76	66	7,00	83	71	7,52	89	77
1,75	6,18	73	63	6,83	81	70	7,42	88	76	7,97	94	81
2,00	7,06	84	72	7,81	93	80	8,49	101	86	9,12	108	93
2,25	7,94	94	81	8,78	104	89	9,55	113	97	10,26	122	105
2,50	8,82	105	90	9,76	116	99	10,61	126	108	11,39	135	116
2,75	9,71	115	99	10,73	127	109	11,67	138	119	12,53	148	128
3,00	10,59	126	108	11,71	139	119	12,73	151	130	13,67	162	139
3,50	12,35	146	126	13,66	162	139	14,85	176	151	15,95	189	163
4,00	14,12	167	144	15,62	185	159	16,97	201	173	18,23	216	186
4,50	15,88	188	162	17,57	208	179	19,10	226	195	20,51	243	209
5,00	17,65	209	180	19,52	231	199	21,22	251	216	22,79	270	232
5,50	19,42	230	198	21,47	255	219	23,34	277	238	25,07	297	256
6,00	21,18	251	216	23,42	278	239	25,46	302	260	27,49	326	280
6,50	22,94	272	234	25,37	301	259	27,58	327	281	29,63	351	302
7,00	24,71	293	252	27,33	324	279	29,70	352	303	31,91	378	325
7,50	26,47	314	270	29,28	347	298	31,83	377	324	34,19	405	349
8,00	28,24	335	288	31,23	370	318	33,95	403	346	36,47	432	372
8,50	30,00	356	306	33,18	393	338	36,07	428	368	38,74	459	395
9,00	31,77	377	324	35,14	417	358	38,19	453	389	41,02	486	418

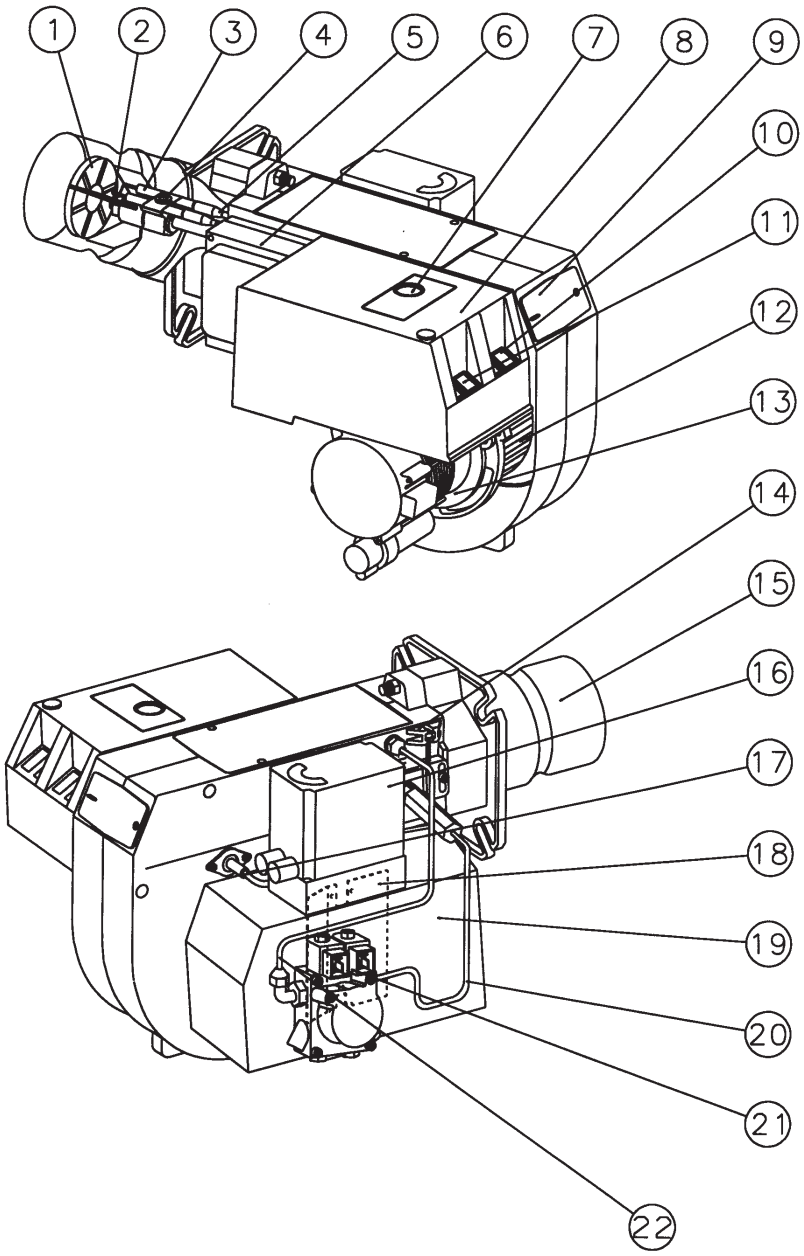
The table applies to oil with a viscosity of 4.4 mm ^{2}/s at a density of 830 kg/m ^{3}.

Pump pressure bar

Gph	17			19			21			23			25		
	kg/h	kW	Mcal/h	kg/h	kW	Mcal/h	kg/h	kW	Mcal/h	kg/h	kW	Mcal/h	kg/h	kW	Mcal/h
1,00	4.85	57	49	5,13	61	52	5,40	64	55	5,65	67	58	5,89	70	60
1,10	534	63	54	5,64	67	57	5,93	70	60	6,21	74	63	6,47	77	66
1,20	5,82	69	59	6,16	73	63	6,47	77	66	6,77	80	69	7,06	84	72
1,25	6,07	72	62	6,41	76	65	6,74	80	69	7,05	84	72	7,35	87	75
1,35	6,55	78	67	6,93	82	71	7,28	86	74	7,62	90	78	7,94	94	81
1,50	7,27	86	74	7,69	91	78	8,08	96	82	8,46	100	86	8,82	105	90
1,65	8,01	95	82	8,47	100	86	8,90	105	91	9,31	110	95	9,71	115	99
1,75	8,49	101	87	8,98	106	92	9,44	112	96	9,88	117	101	10,30	122	105
2,00	9,71	115	99	10,26	122	105	10,79	128	110	11,29	134	115	11,77	140	120
2,25	10,92	130	111	11,55	137	118	12,14	144	124	12,70	151	129	13,25	157	135
2,50	12,13	144	124	12,83	152	131	13,49	160	138	14,12	167	144	14,72	175	150
2,75	13,35	158	136	14,11	167	144	14,84	176	151	15,53	184	158	16,19	192	165
3,00	14,56	173	148	15,39	182	157	16,18	192	165	16,93	201	173	17,65	209	180
3,50	16,99	201	173	17,96	213	183	18,89	224	193	19,77	234	202	20,61	244	210
4,00	19,42	230	198	20,53	243	209	21,59	256	220	22,59	268	230	23,56	279	240
4,50	21,84	259	223	23,09	274	235	24,28	288	248	25,41	301	259	26,49	314	270
5,00	24,27	288	247	25,65	304	262	26,98	320	275	28,24	335	288	29,44	349	300
5,50	26,70	317	272	28,22	335	288	29,68	352	303	31,06	368	317	32,38	384	330
6,00	29,13	345	292	30,79	365	314	32,38	384	330	33,89	402	346	35,33	419	360
6,50	31,55	374	322	33,35	395	340	35,07	416	358	36,70	435	374	38,26	454	390
7,00	33,98	403	347	35,92	426	366	37,77	448	385	39,53	469	403	41,21	489	420
7,50	36,41	432	371	38,49	456	392	40,47	480	413	42,35	504	434	44,16	524	450
8,00	38,80	460	396	41,05	487	419	43,17	512	440	45,18	536	461	47,10	559	480
8,50	41,26	489	421	43,62	517	445	45,87	544	468	48,00	569	489	50,05	594	510
9,00	43,69	518	446	46,18	548	471	48,57	576	495	50,83	603	518	52,99	628	540
9,50	46,11	547	470	48,75	578	497	51,26	608	523	53,65	636	547	55,93	663	570
10,00	47,11	559	480	51,32	609	523	53,96	640	550	56,47	670	576	58,88	698	600
11,00	53,40	633	545	56,45	669	576	59,36	704	605	62,12	737	633	64,77	768	660
12,00	58,25	691	594	61,58	730	628	64,76	768	660	67,77	804	691	70,66	838	721
14,00	67,96	806	693	71,84	852	733	75,55	896	770	79,09	938	806	82,43	978	841
16,00	77,67	921	792	82,11	974	837	86,34	1024	880	90,36	1072	921	94,20	1117	961

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

2.8 Description



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

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

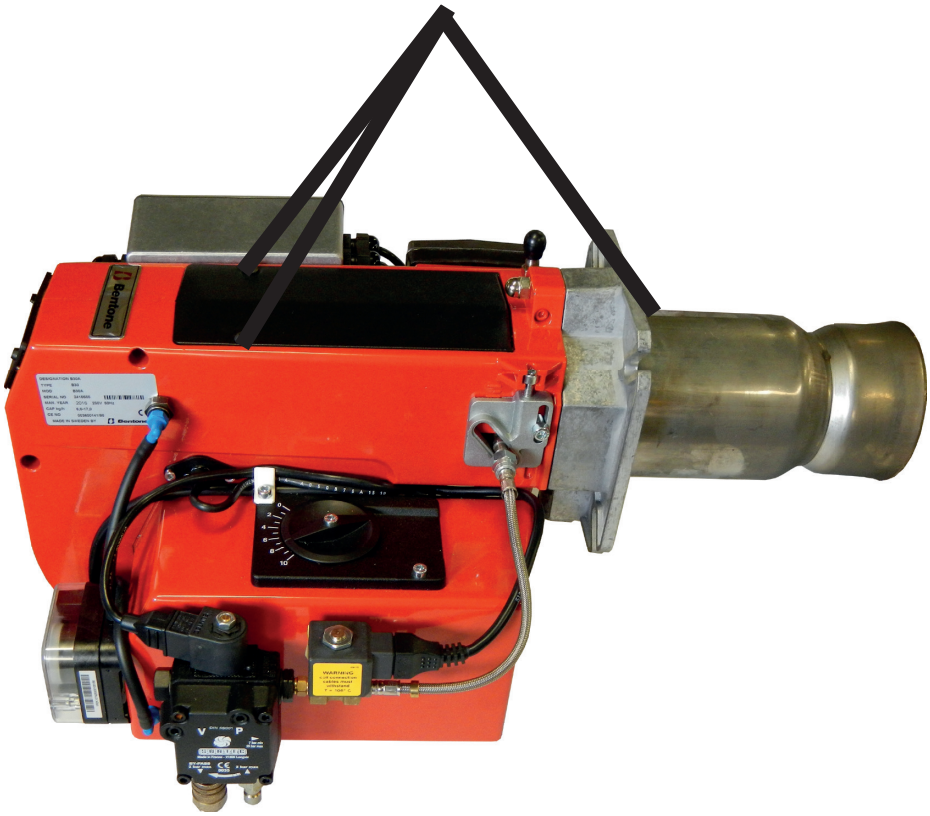
The boiler/burner should be examined regularly for any signs of malfunction or oil leakage, (see Service schedule).

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.

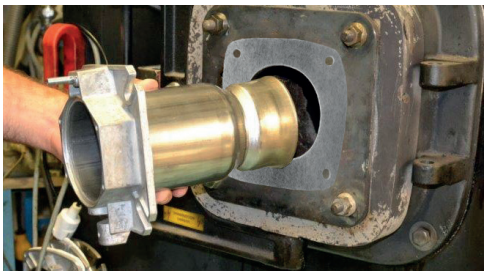
! Be sure to fill the burner oil system before starting it for the first time.

4.5 Electrical connection

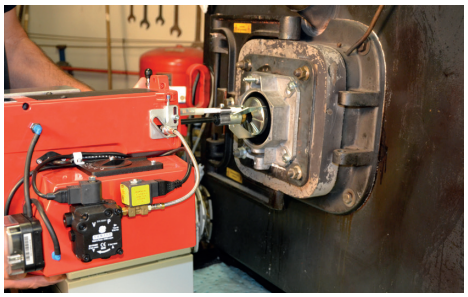
- Before work on the electrical connection, the current should be disconnected so that the installation is isolated.
- Electrical connection must be done in accordance with the applicable regulations.
- Burners should be connected to an isolator switch.
- The connection should be made in accordance with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

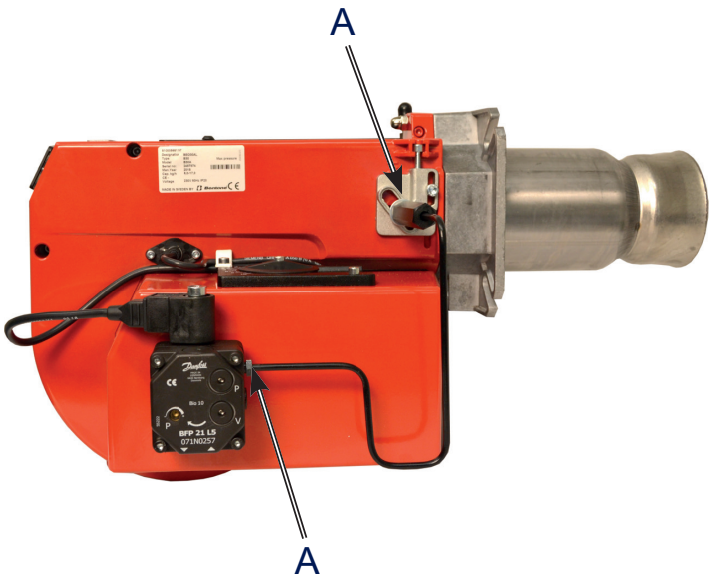


8. Insulate between the burner and boiler door to reduce radiated heat.
9. Install the burner body on the flange.
10. Lock the burner body using with the nut/nuts.
11. Connect the oil pipes to the pump, (see Burner servicing).
12. Connect the burner electrically, (see Burner servicing).

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.



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5. Burner installation

5.1 Examples of basic setting B 30 2A

Burner output	150 kW
Estimated nozzle output	150 kW/11,86 kWh/kg*= 12,6 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	3,50 gph
Power in	12,35 kg/h => 12,35 kg/h x 11,86 kWh/kg = 146,5 kW

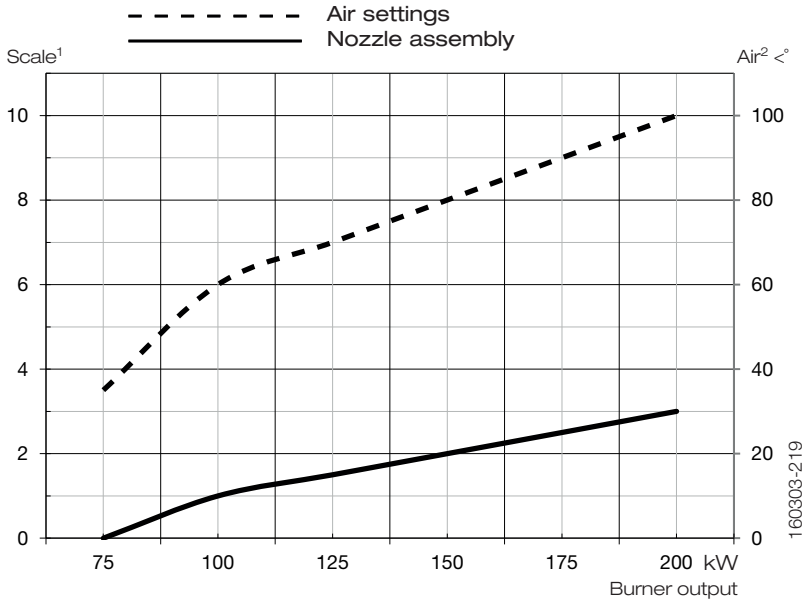
Basic settings

The setting value for 150 kW according to default settings tables. Refer to 6.5 for the correct settings procedure. Nozzle assembly adjustment, brake plate B30. Air setting 6.6.

Effects and nozzle selection from example	
Nozzle assembly	2
Damper	80

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.

5.2 Setting values for nozzle and air damper



[1] Scale nozzle assembly and air damper without damper motor.
[2] Settings air damper with damper motor.

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5.3 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 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.

Recommended excess air

Grade of Oil	Excess air flue gases		Max. % CO_2
	% O_2	% CO_2 Lambda 1.2	
Light oil, B10 heating oil/ biofuel blend (as defined in DIN V51603-6)	4±1	≈12,5	15,4

6. Burner servicing

6.1 Servicing the combustion assembly

Removal and installation

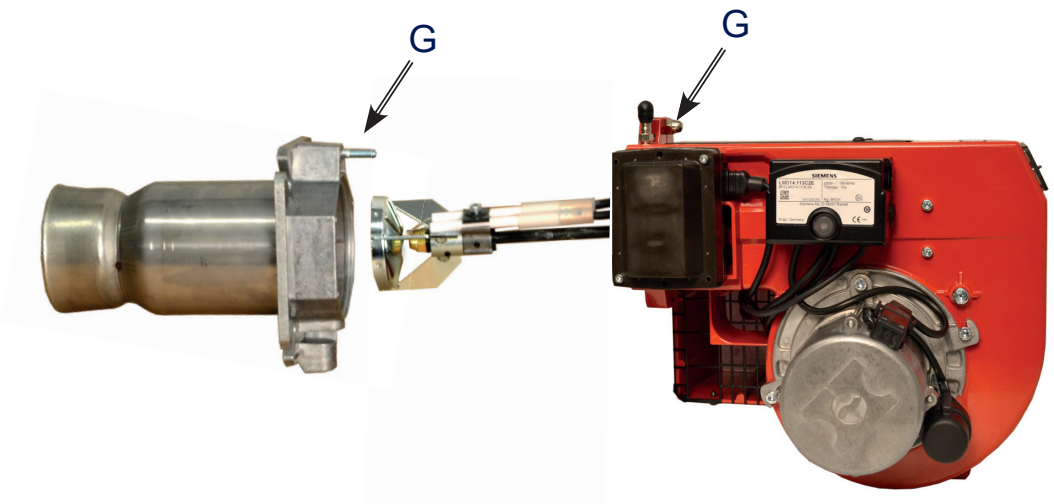
1. Switch off the main power.

> ! 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.

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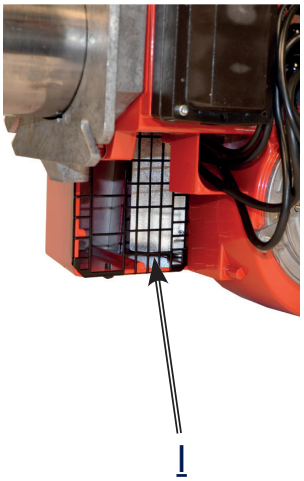
6.2 Servicing air dampers

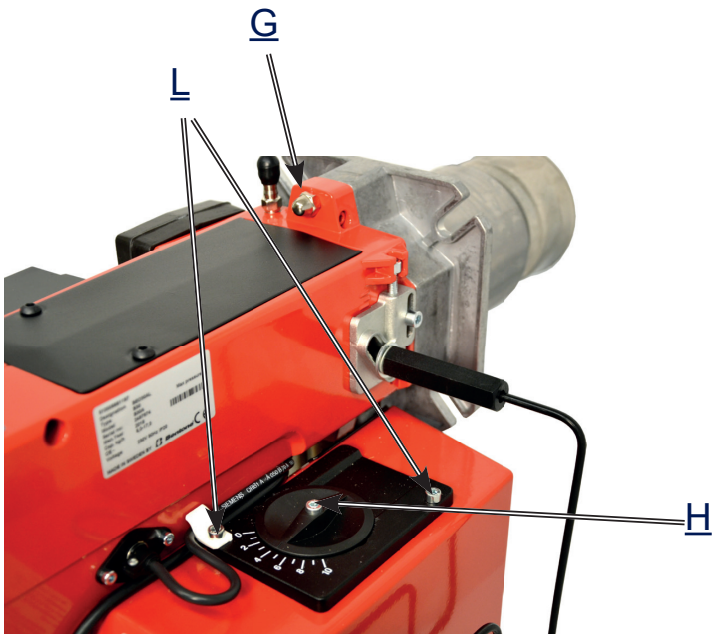
Removal and installation

1. Switch off the mains power.

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

2. Note the position of the air damper and loosen the actuator locking screw (H).
3. Loosen the screws (L) securing the air damper.
4. Set the scale to 7 and lift up.
5. Clean the air damper (I) and the intake. Lubricate the damper axle bearings if necessary.
6. Refit the air damper and actuator.
7. Install the intake grille for the air intake.
8. Turn on the mains power.
9. Check/adjust combustion.





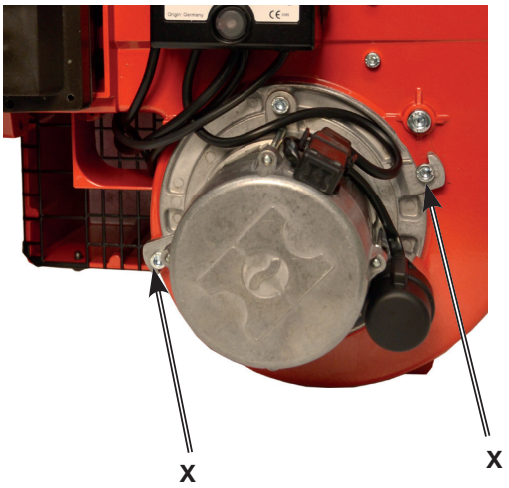
> **!** When servicing/replacing components that affect combustion, an analysis and soot test shall be carried out on the installation.

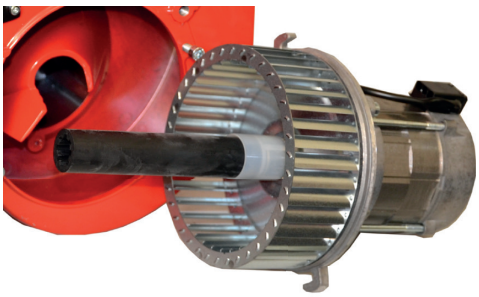
6.3 Servicing the fan

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 (X).
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.

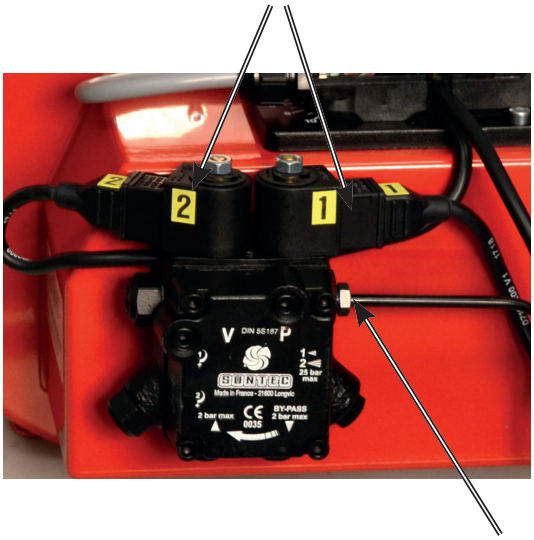
6.4 Replacement of oil pump

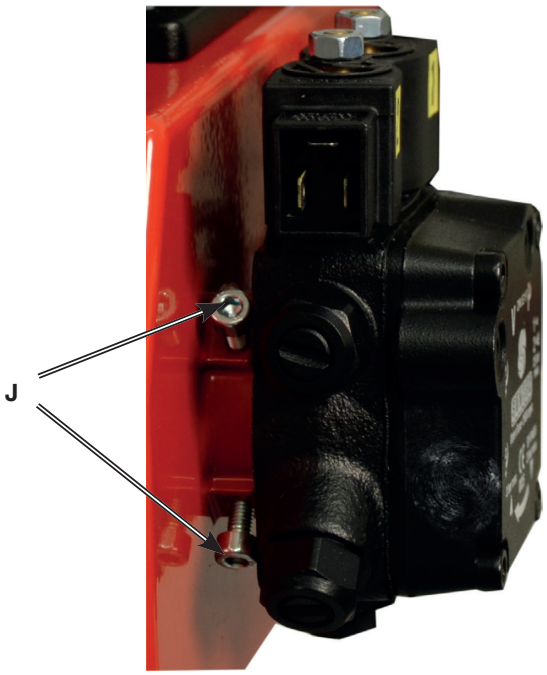
Removal and installation

1. Switch off the mains power.

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

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



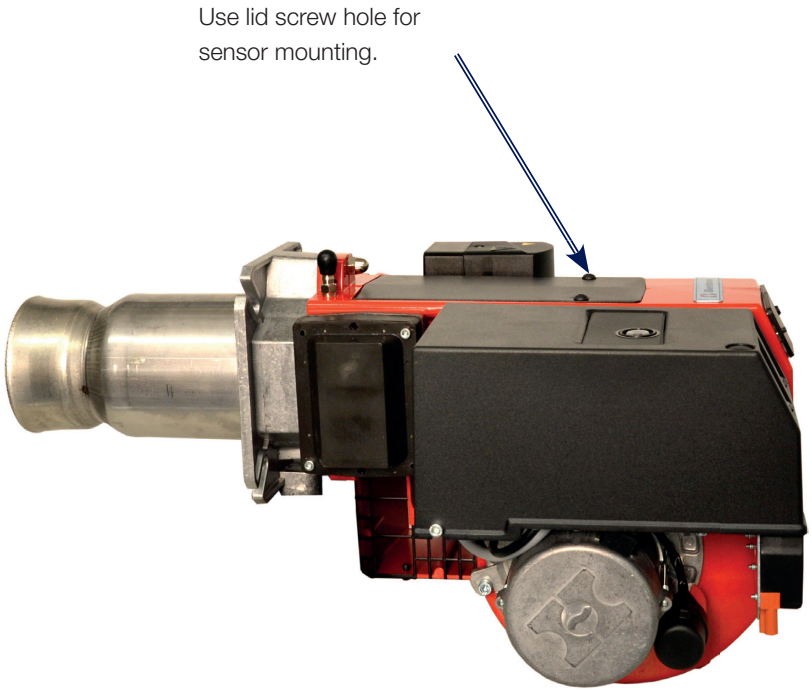


> **!** When servicing/replacing components that affect combustion, an analysis and soot test shall be carried out on the installation.

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 damaged, dirty or unbalanced.
- Check motor bearings. If worn change motor/bearings.



6.6 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

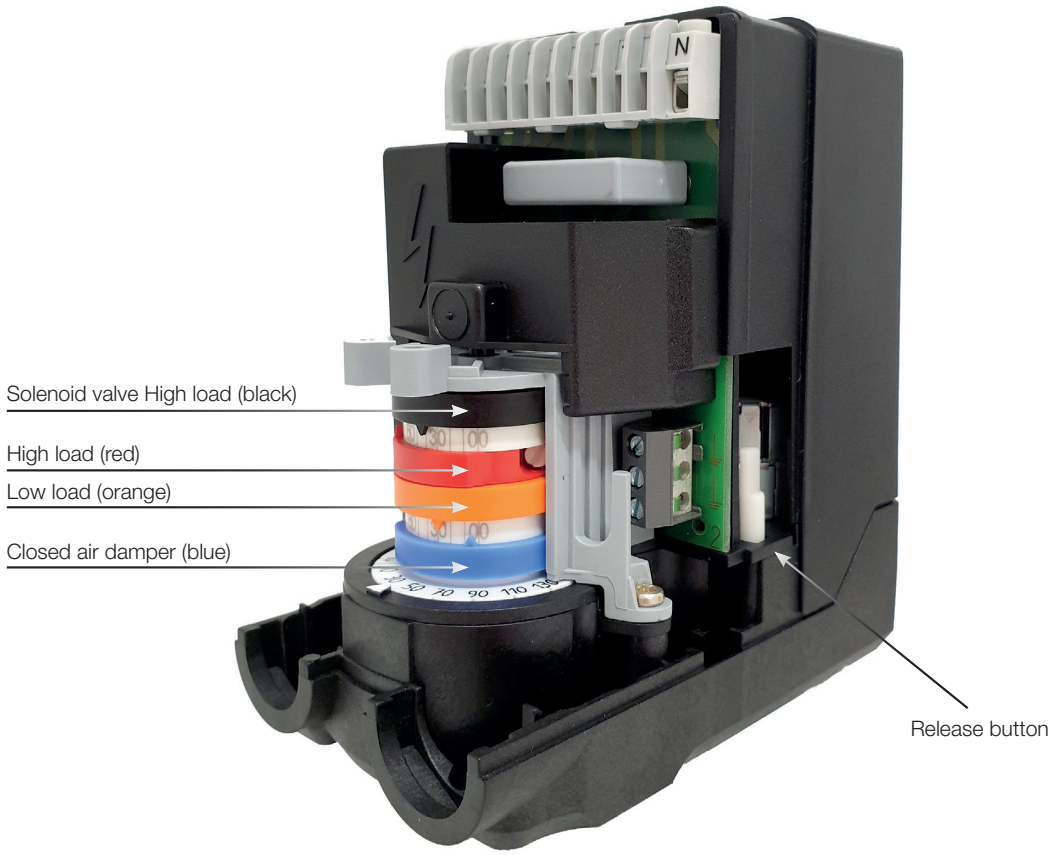
- Set control switch for load position to position II (high load).
- Turn orange cam disc to 0° to reduce airflow and to 90° to increase airflow.
- Return the control switch to position I (low load) and check the combustion values.

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

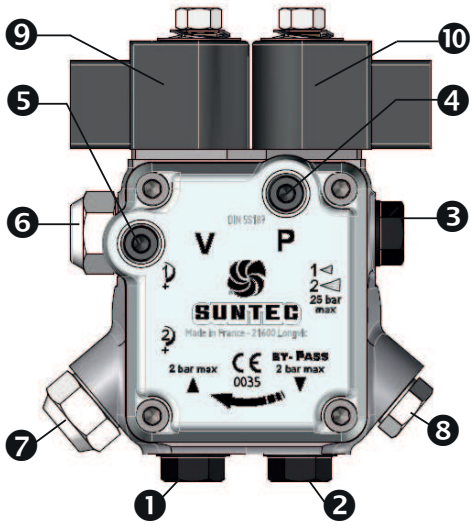
By pressing the button, the motor is disengaged and the air damper can be turned. The function is used when servicing air dampers.



7. Instructions Pump

7.1 SUNTEC AT2 45C, AT2 55C

Technical data		
One or two-pipe system.		
Viscosity range::	2-12 mm^2/s	
Pressure range::	8-25 bar	
Rated voltage of coil:	220/240V	50/60 Hz
Oil temperature::	max 60°C	



Components

1. Suction line G 1/4”
2. Return plug
3. Nozzle outlet G 1/8” Stage 2 and stage 1
4. Pressure gauge port G 1/8”
5. Vacuum gauge port G 1/8”
6. Pressure adjustment Stage 1
7. Pressure adjustment Stage 2
8. Pressure adjustment
9. Solenoid valve 1
10. Solenoid valve 2

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Pump operating principle for AT2

The SUNTEC AT2 oil pump features 2 mode pressure operation and incorporates a blocking solenoid valve with in-line cut-off function. Switching between low and high modes is assured by a 2nd integral solenoid valvesolenoids are activat-ed, oil passes to the nozzle lines at the pressure set by the pressure regulating valve.

Applications

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

- Two firing rates (with a sole nozzle line).
- One or two-pipe system.

Pump operating principle

The gear set draws oil from the tank through the built-in filter and transfers it to the nozzle line via the cut-off solenoid valve. Pressure regulation is assured by two spool valves, one for each pressure mode. Switching between low and high pressure is assured by a ”normally open” by-pass solenoid valve.

When this solenoid is non-activated, a by-pass channel is open, allowing the normal functioning of the low pressure regulating valve which sets the nozzle pressure. When this solenoid is activated, the by-pass channel is closed, thus pressure will build up on both sides of the low pressure regulating valve eliminating its effect, and the high pressure regulating valve now determines the nozzle pressure.

The blocking solenoid valve of the nozzle line is of the ”normally closed” type. This design ensures extremely fast response and the switching can be selected according to the burner operating sequence and is independent of motor speed.

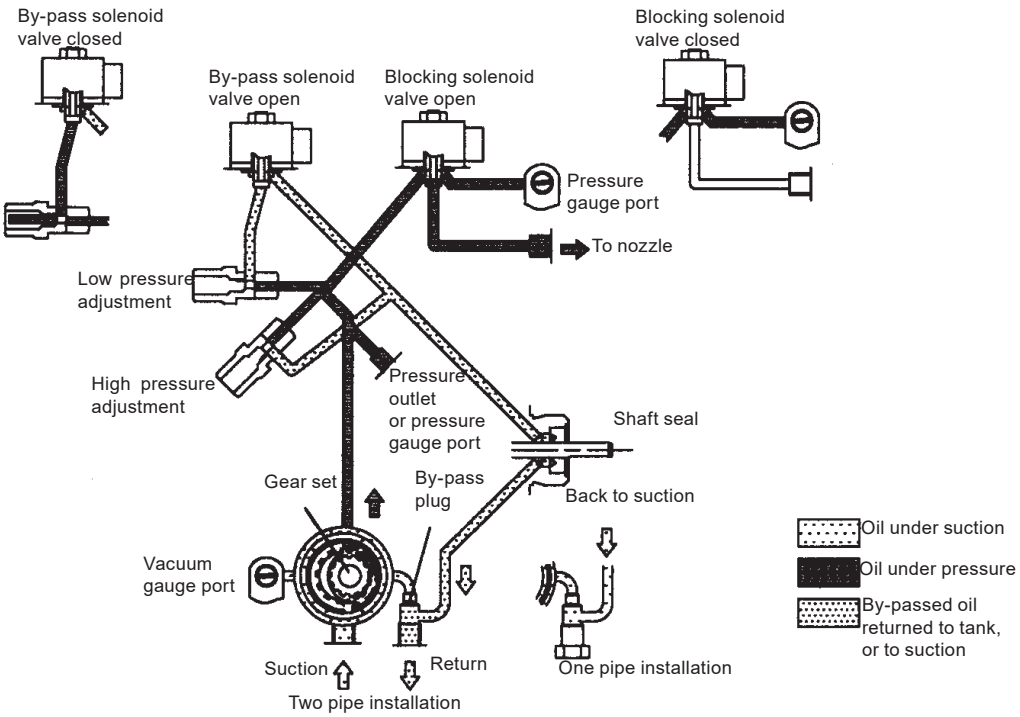
When this solenoid valve is non-activated, the valve is closed and all oil pressurized by the gear set passes through the regulators to suction or to the return line, depending upon pipe arrangement.

As soon as this solenoid is activated, oil passes to the nozzle line at the pressure set by the pressure regulating valves.

In two pipe operation, the by-pass plug must be fitted in the return port, which ensures that the oil dumped by the regulating valves is returned to the tank and the suction line flow is equal to the gear set capacity.

Bleeding in two pipe operation is automatic (it is assured by a bleed flat on the piston of the low pressure regulator), but it may be accelerated by opening a pressure port.

In one pipe operation, the by-pass plug must be removed, and the return plugged. Oil which is not required at the nozzle is returned directly to the gear inlet via the pressure regulating valves, and the suction line flow is equal to the nozzle flow. A pressure port must be opened to bleed the system



7.1.1 Suction line tables

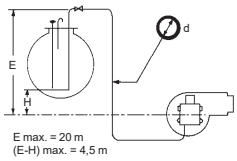
7.1.1.1 Overlying tank

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	65	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 monotube en charge
Impianti monotubo a sifone

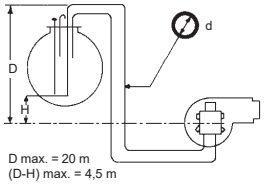


Two-pipe system

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 bitube en charge
Impianti bitubo a sifone



7.1.1.2 Underlying tank

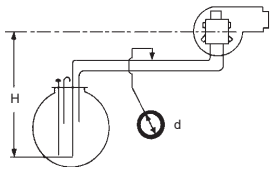
1-pipe system

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	55
4			8	19			5	14				9			6	14			4	11

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



H max. = 4,5 m

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 accor-ding 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.

7.1.2 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.

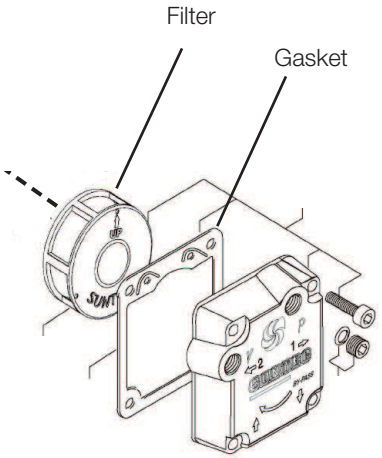
> **!** Use caution when operating the burner, surfaces may be hot.

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

7.1.3 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.

7.1.4 Replacing the solenoid valve (pump)

Removal and installation

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

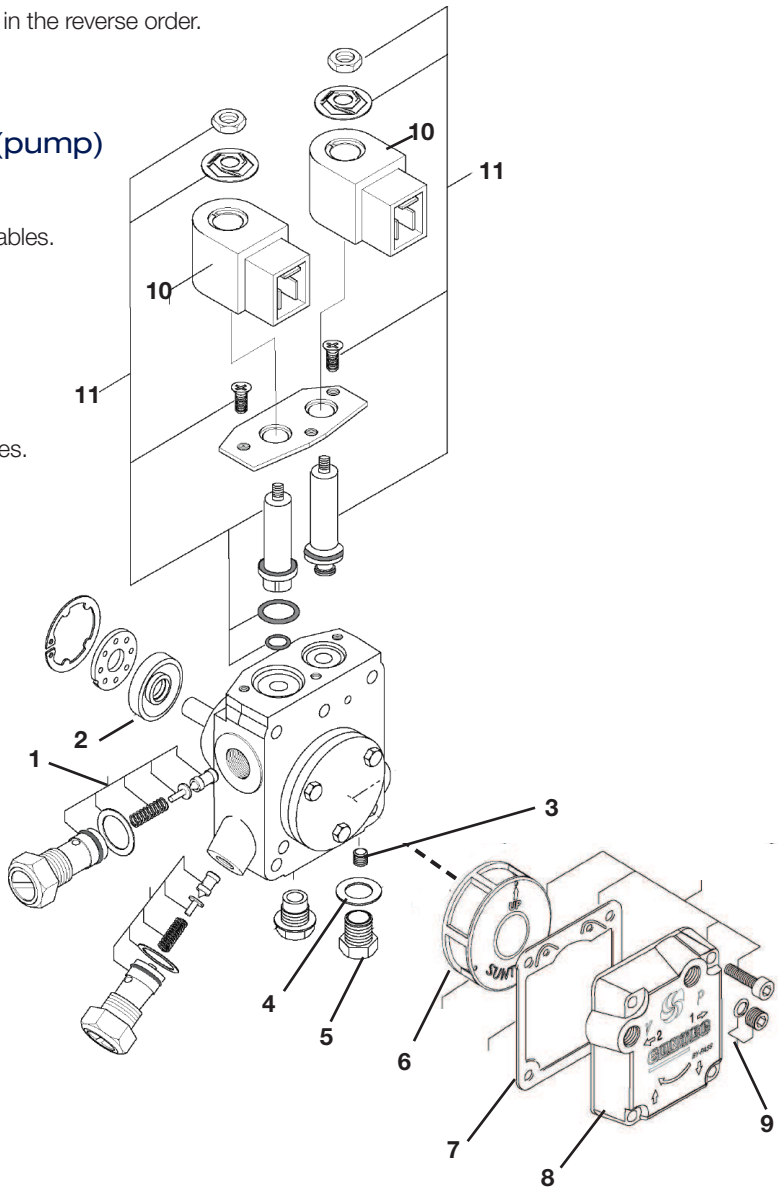
> **!** If the burner is directly connected, ensure that all components on the burner are without power.

2. Disconnect the solenoid valves' electrical cables.
3. Loosen the nut holding the magnet terminal.
4. Loosen the screws securing the valve's mounting plate.
5. Remove the valve.
6. Check to ensure the correct valve is in place (there are two versions – NC and NO).
7. Install the new valve and refit the other parts in the reverse order.
8. Check functionality.

7.1.5 Replacing the gasket seal (pump)

Removal and installation

1. Disconnect hoses, oil pipes, and electrical cables.
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.



Component list Oil pump

1. Pressure regulator kit 5 - 25 bars
2. Shaft seal kit (lip seal + protective cone)
3. By-pass plug
4. G 1/4 gasket
5. G 1/4 steel plug
6. Filter
7. Cover gasket
8. Cover gaskets + filter
9. Pressure gauge port or vacuum gauge port screw, O-ring
10. Coil
11. Tube assy

8. 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.

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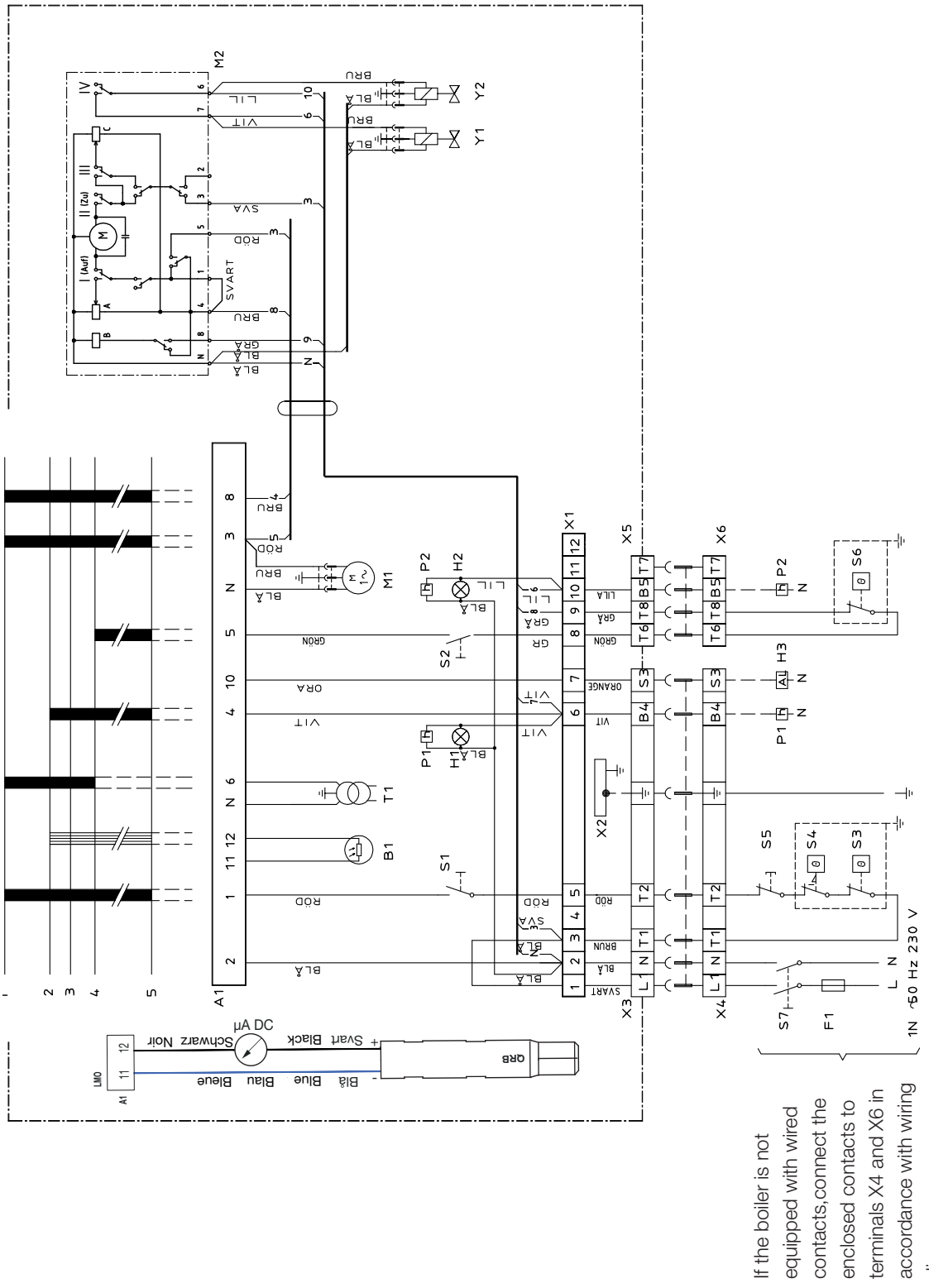
9. Oil burner control

9.1 Wiring diagram



If the boiler is not equipped with wired contacts,connect the enclosed contacts to terminals X4 and X6 in accordance with wiring diagram.

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9.1.1 List of components

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

9.2 Function LMO14/24

1 **Switch on operating switch and twin thermostat**
A spark is formed. The air damper motor opens the damper to low load position. The burner motor starts, the prepurge goes on till the prepurge period expires and the solenoid valve 1 opens (2).

2. **Solenoid valve 1 opens**
Oil mist is formed and ignited. The photocell indicates a flame. The ignition spark goes out after flame indication (See Technical data oil burner control).

3. **The safety time expires**

a If no flame is established before this time limit the control cuts out.

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

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

4-5 **Operating position**
If the burner operation is interrupted by means of the main switch or the thermostat, a new start takes place when the conditions in accordance with point 1 are fulfilled.

The oil burner control cuts out
A red lamp in the control is lit. Press the reset button and the burner re-starts.

! Mains connection and fuse in accordance with local regulations.

9.2.1 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

160303-333

9.3 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

9.4 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.

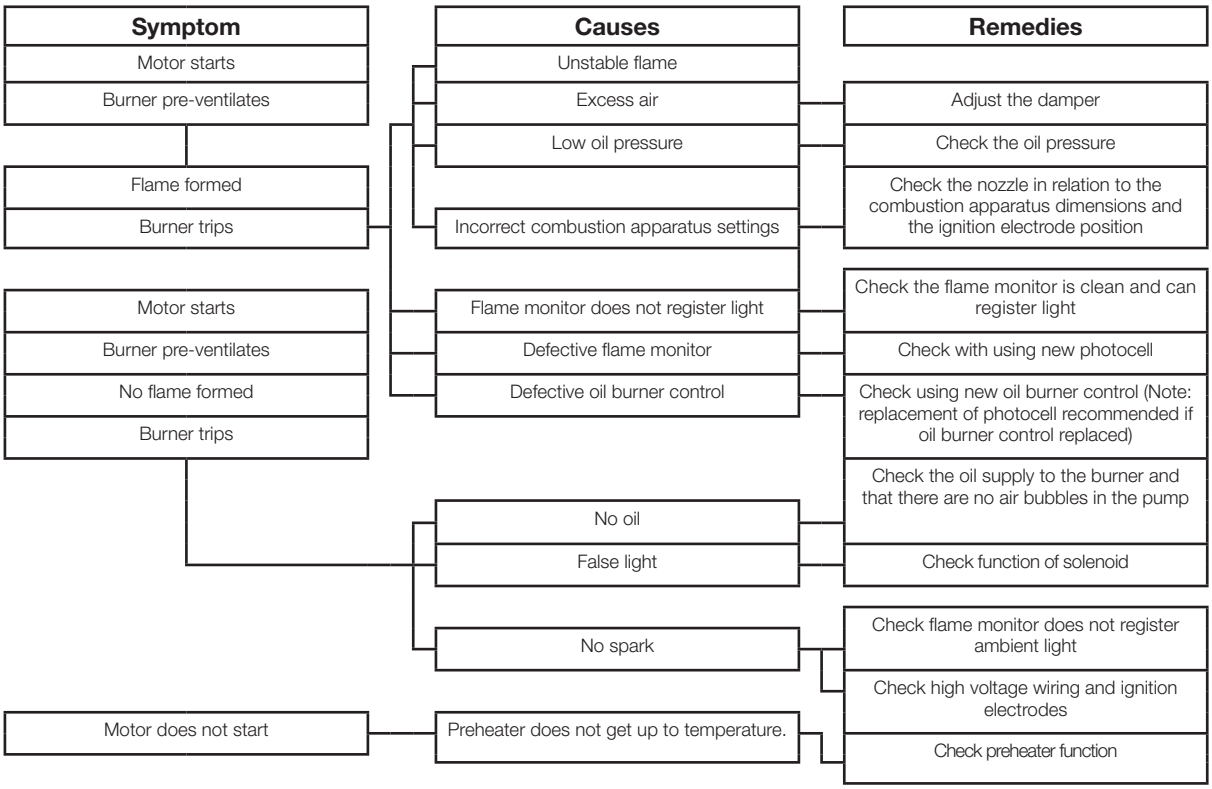
To return to normal operation: Press the reset button for 1 second.

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.

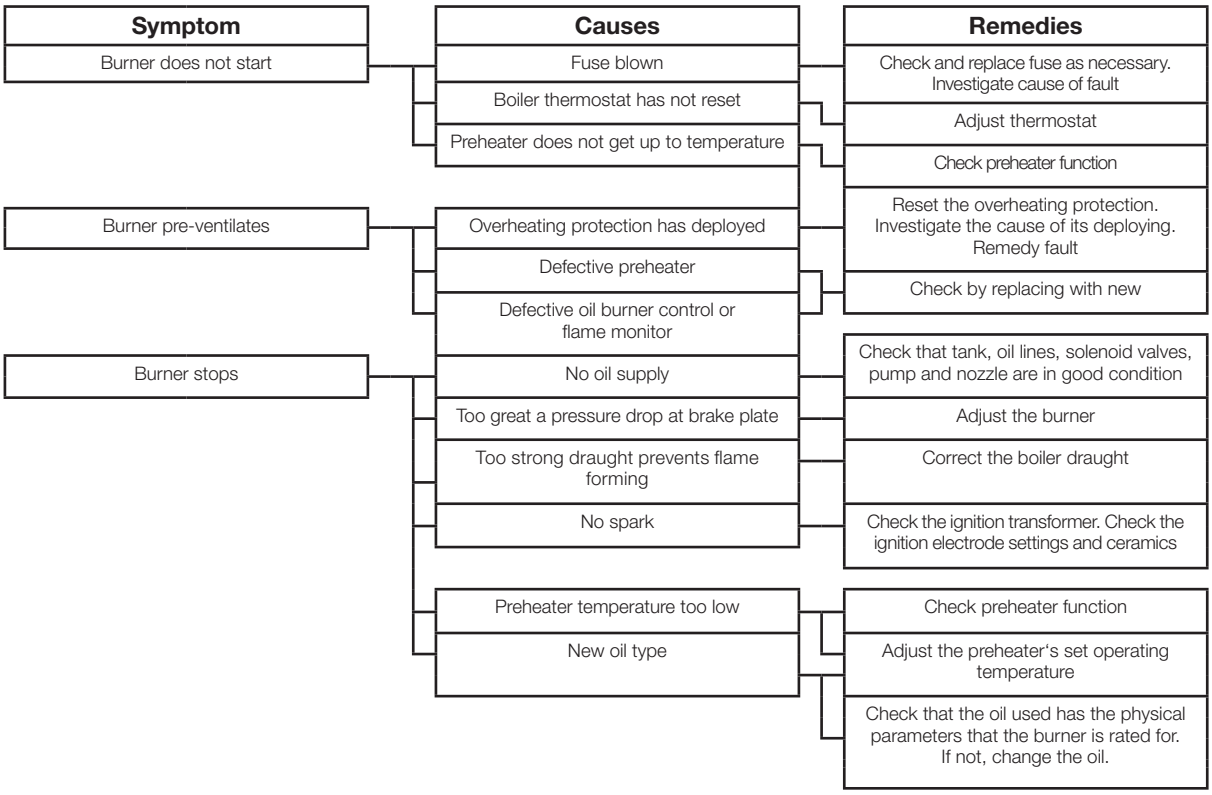
To return to normal operation: Press the reset button for 1 second.

10. Fault Location

10.1 Burner will not start



10.2 Burner will not start after normal use



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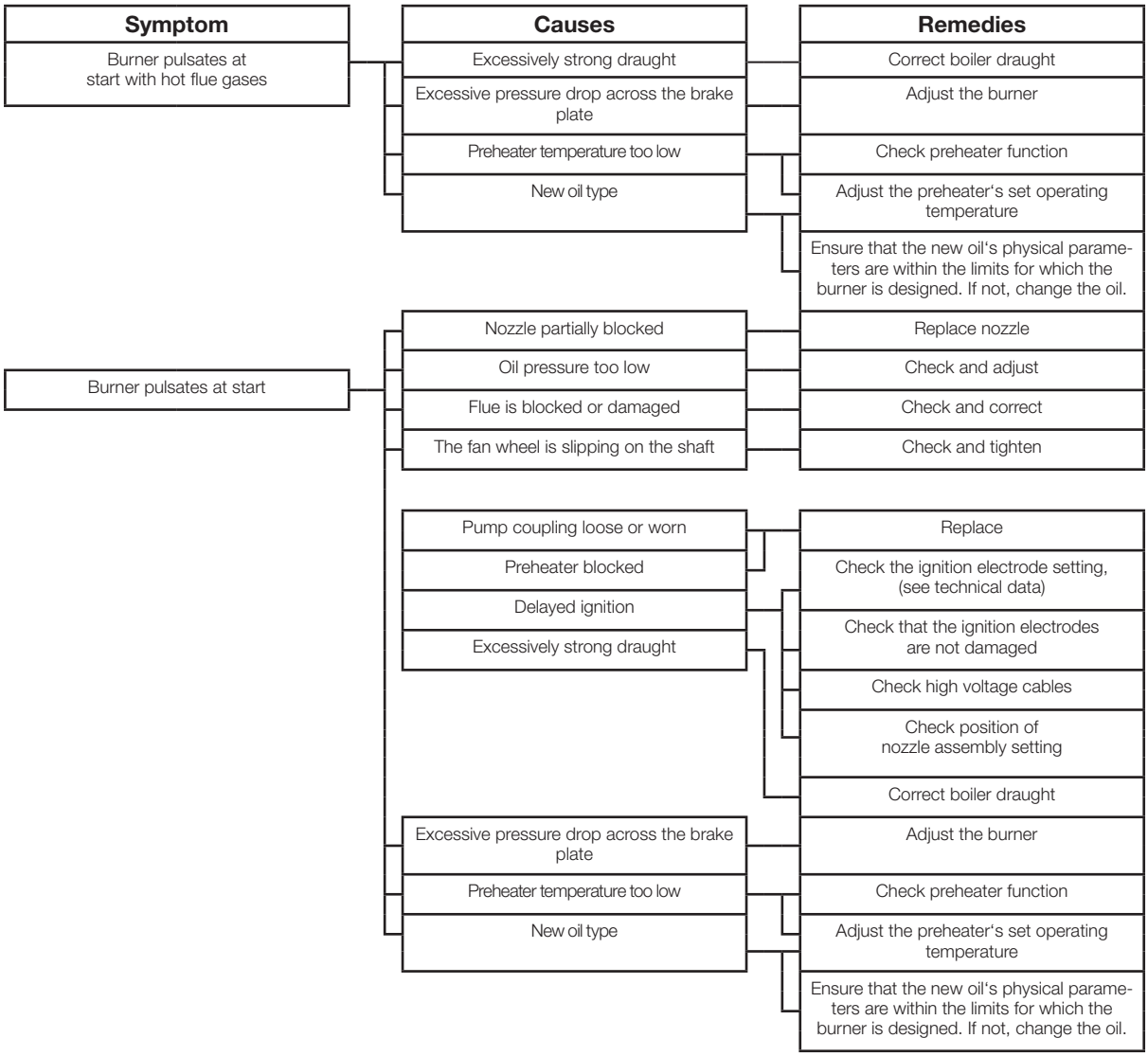
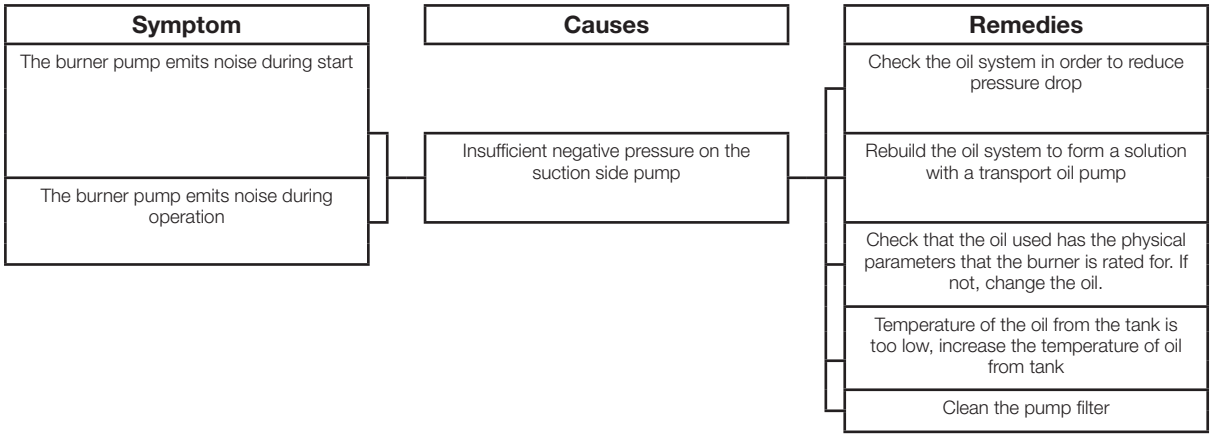
10.3 Delayed ignition



10.4 Noise in pump



10.5 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

11. 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:

12. Oil burners maintenance instructions

General information

Keep the boiler room clean. Ensure that the boiler room has permanent fresh air intake. Switch off before dismantling the oil burner.
At hinged mounting, make sure that an automatic safety switch is fitted, so that the burner cannot start when theswing door is open.
Don´t use the oil fired boiler to burn paper or rubbish,unless the boiler is especially fitted with a hinged door tomake this possible.
Don´t fill tank while burner is working.

Starting precautions

Make sure that the oil tank is not empty
Make sure that the valves on oil and water supply pipes areopen.
Make sure that the boiler flue damper is open.
Make sure that the boiler thermostat is set at the correct temperature.
Switch on the current. Most relay systems have a delayed action so that the burner will not start for perhaps 20 seconds.
With heavy oil the delay will be longer as the burner will notstart until the oil in the preheater reaches the requiredtemperature.

If the burner will not start

Press the reset button on the relay. Check that the thermostats are correctly adjusted.
Don´t forget the room thermostat, check that any fusesare intact and main switch is on.

If the burner starts but does not ignite

Make an attempt to start the burner.
Never make close repeated start attempts.
Don´t restart the burner until the boiler is free from oil gases.
If the burner still does not ignite send for the service engineer.

When switching off during summer

Always use the main switch to cut out the burner even when adjusting the burner or cutting off the heating for ashort time. For longer periods of shut down, close all valves and the oil supply stopcock.
Clean the filter and nozzle by washing in petrol or paraffin.
Make sure the filter medium is not damaged or defective.
Protect electrical gear from damp.

Warning

Never stand too near or put your face to the inspection or fire door, when the burner is about to start.
Never use a naked flame to ignite oil if the electrical ignition fails.
Always wait for about 10 minutes for the unburnt gases to disperse before restarting the oil burner if it has failed to ignite previously.

Installed by:

……..

Tel:……..

EU Declaration of conformity

CE

Bentone Oil Burners

Type

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

This declaration of conformity is issued under the sole responsibility of the manufacturer. The object of the declaration described above is in conformity with:

Machinery Directive 2006/42/EC

EMC 2014/30/EU

Restriction of the use of certain hazardous substances (RoHS) Directive 2011/65/EU

References to the relevant harmonised standards used or references to the other technical specifications in relation to which conformity is declared:

EN 267:2009+A1:2011	Excluded Annex J/K. Automatic forced draught burners for liquid fuels.

Additional information can be downloaded at:

www.bentone.com

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Ljungby, January 26th 2021

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Enertech AB

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