Enertech Group

Installation & Maintenance Manual

MOL 2540-3H (B80 2-3)

Oil Burner

11/12

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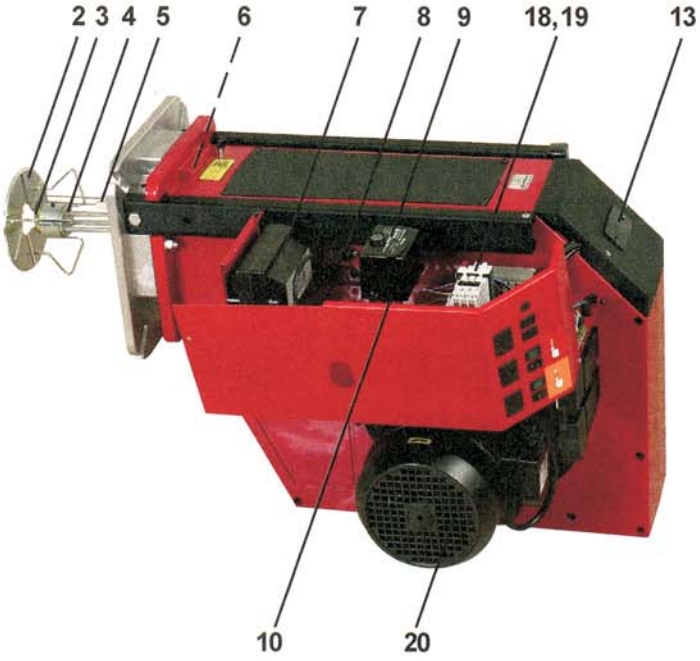
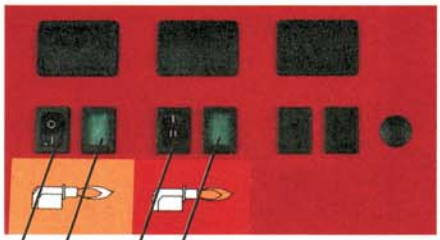
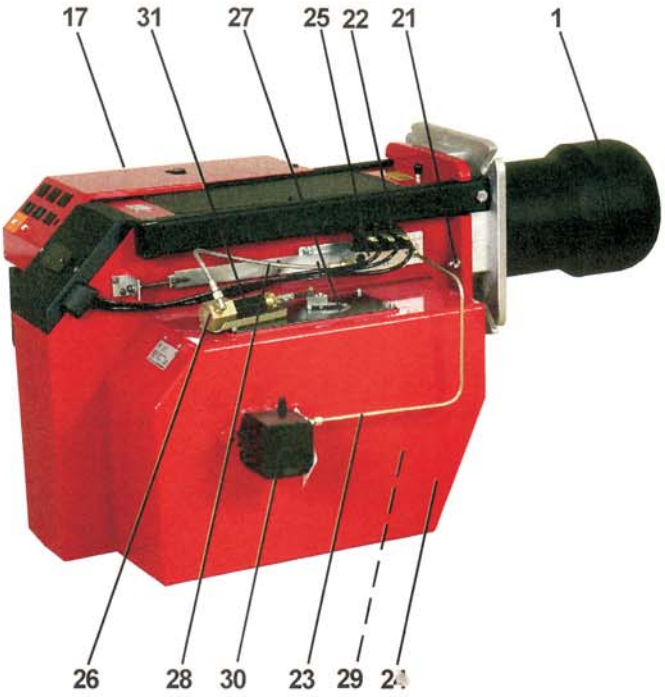
DESCRIPTION







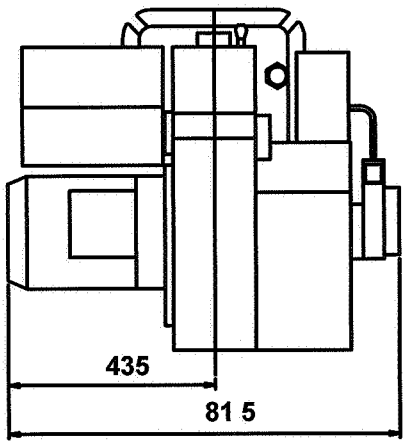
COMPONENTS

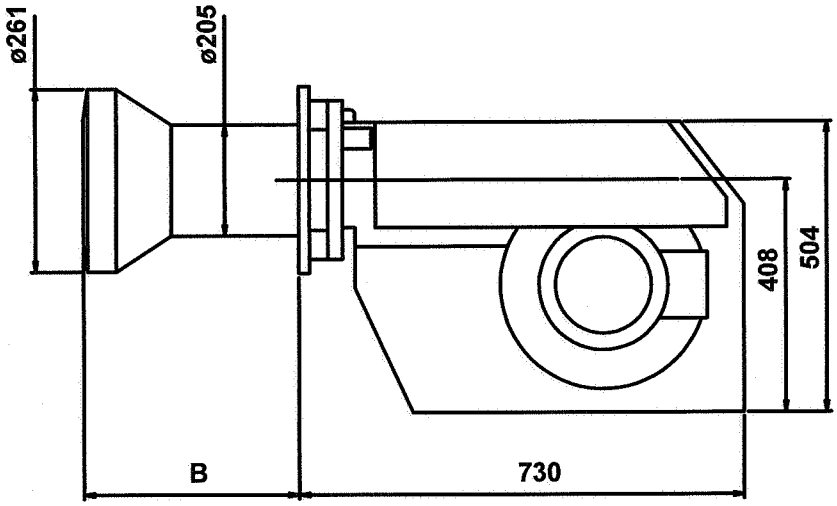
1. Flame cone
2. Shrouded disc
3. Nozzle
4. Nozzle assembly
5. Ignition electrodes
6. Ignition cable
7. Ignition transformer
8. Photoresistor
9. Control box
10. Front plate, relay base
11. Switch I-II
12. Indicating lamp Stage 2
13. Cover, inspection glass
14. Indicating lamp Stage 1
15. Switch 0-I
17. Electric panel
18. Contactor
19. Thermal overload protection
20. Motor
21. Locking device, flange
22. Solenoid valves
23. Connecting pipe pump-solenoid valve bloc
24. Air intake
25. Solenoid valve bloc
26. Nozzle assembly adjustment
27. Scale, air regulation
28. Connecting pipe, solenoid valve bloc-adjustment device
29. Air damper
30. Pump
31. Adjustment device

TECHNICAL DATA

Type designation B 80-2.3H

DIMENSIONS





	Length of burner tube	Flange Measure B
Burner head	396	356
Burner head	596	556
Burner head	696	656

OUTPUT RANGE AND NOZZLES RECOMMENDED

	Oil capacity kg/h	Output kW	Output Mcal/h	Recommended nozzle Angle	Danfoss	Monarch	Recommended Pump pressure
Burner head	50-214	593-2538	510-2182	45° - 60°	B	PLP	14 bar

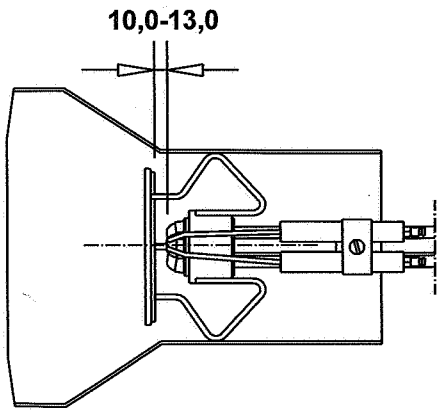
The net calorific value of 11,86 kWh/kg for light oil has been used.

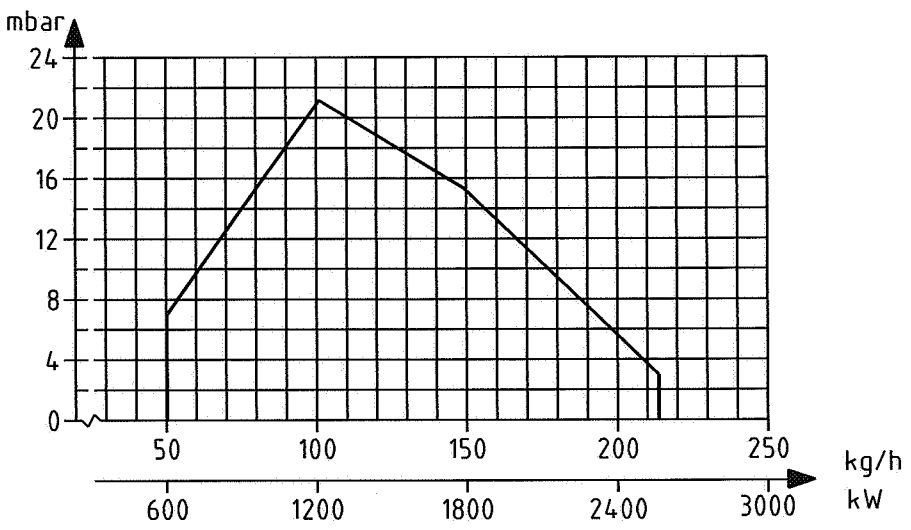
RECOMMENDED NOZZLE

Because of different boiler types existing on the market, with varying combustion chamber designs, it is not possible to state a definite spray angle or spray pattern.

Note that the spray angle and the spray pattern change with the pump pressure.

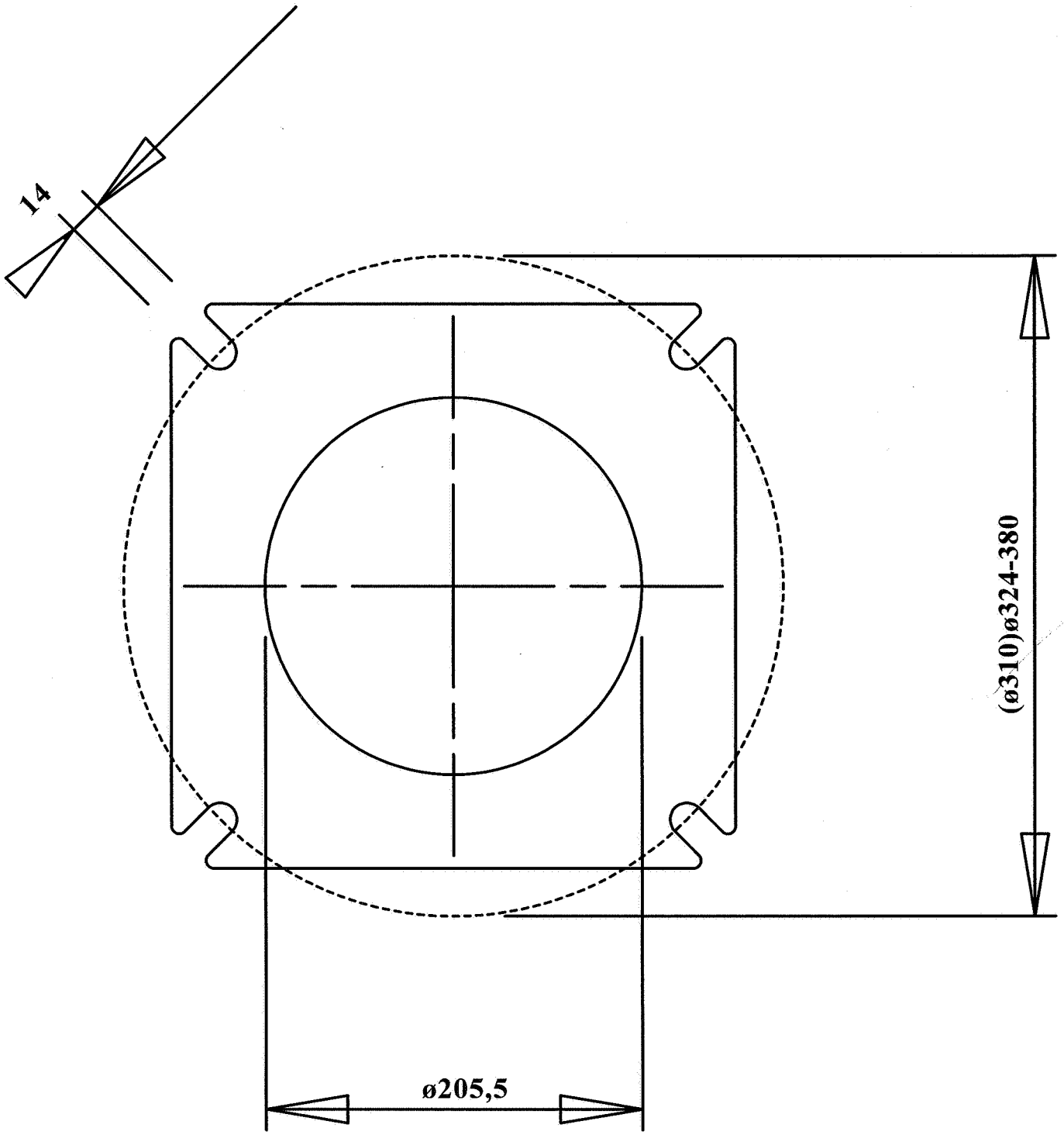
BURNER HEAD





TECHNICAL DATA

DIMENSIONS OF FLANGE



GENERAL INSTRUCTIONS

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.

INSTALLATION INSTRUCTIONS

General installation instructions accompany the burner and should be left in a prominent place adjacent to the burner.

ADJUSTMENT OF BURNER

The burner is from the factory pre-set to an average value that must then be adjusted to the boiler in question.

All burner adjustments must be made in accordance with boiler manufacturers instructions. These must include the checking of flue gas temperatures, average water temperature and CO_2 or O_2 concentration.

To adjust the combustion device, start by increasing the air volume and the nozzle assembly somewhat. When the burner starts it is burning with excess air and smoke number 0. Reduce the nozzle assembly adjustment until soot occurs, and then increase the adjustment to make the soot disappear again. Then the volume of air is reduced until soot occurs and increased again to reach a combustion free of soot.

By this procedure an optimum adjustment is obtained. If larger nozzles are used the preadjustment of both the air volume and the nozzle assembly must be increased.

A whistling sound may be heard which can be eliminated or reduced as follows: Increase the nozzle assembly adjustment somewhat. The CO_2-content and consequently the air volume will then be reduced.

CONDENSATION IN CHIMNEY

A modern burner works with less excess air and often also with smaller nozzles than older models. This increases the efficiency but also the risk of condensation in the chimney. The risk increases if the area of the chimney flue is too large. The temperature of the flue gases should exceed 60°C measured 0,5 metres from the chimney top.

Measures to raise the temperature:

Insulate the chimney in cold attics

Install a tube in the chimney

Install a draught regulator (dilutes the flue gases during operation and dries them up during standstill)

Increase the oil quantity

Raise the flue gas temperature by removing turbulators, if any, in the boiler.

PUMP ADJUSTMENT

See separate description.

MAINTENANCE

The boiler/burner should be examined regularly for any signs of malfunction or oil leakage.

OIL SUPPLY

The oil line should be dimensioned in accordance with the pump manufacturer´s instruction. In the suction line to the burner a filter should be mounted to prevent any particles in the oil from reaching the burner. If the installation consists of several burners each one should have its own suction line from the tank or a circulation system should be used.

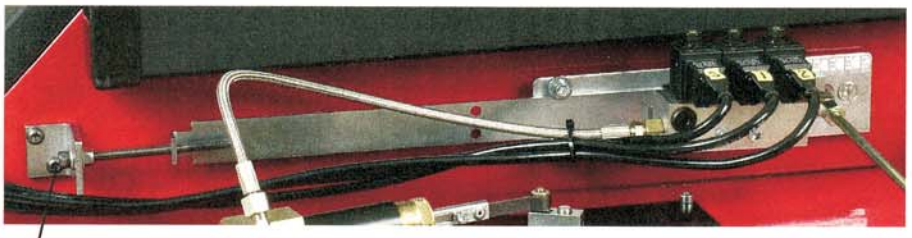
The temperature in the oil line should be kept as constant as possible. Avoid exposing the line to excessive cold which may cause blockages of paraffin deposits.

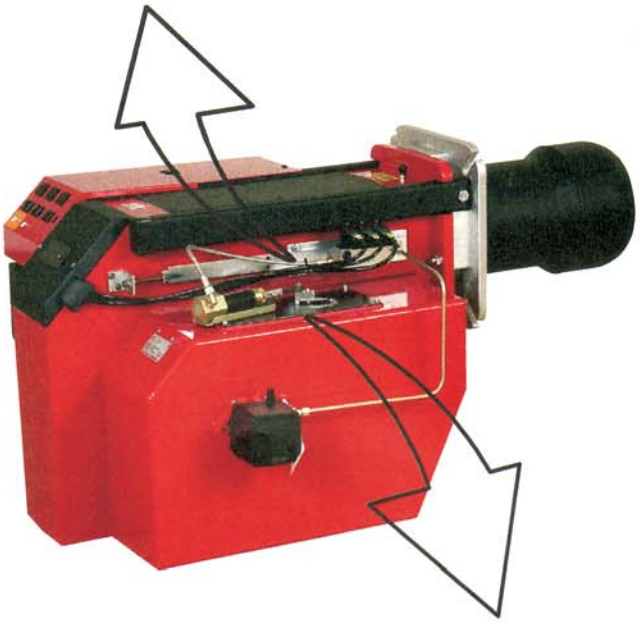
The oil pipe and electric cable should be fitted so that the burner can be placed on the floor for inspection of the combustion device.

GENERAL INSTRUCTIONS

ADJUSTMENT OF NOZZLE ASSEMBLY

Adjust the nozzle assembly with the adjustment screw D to the desired position.





AIR ADJUSTMENT

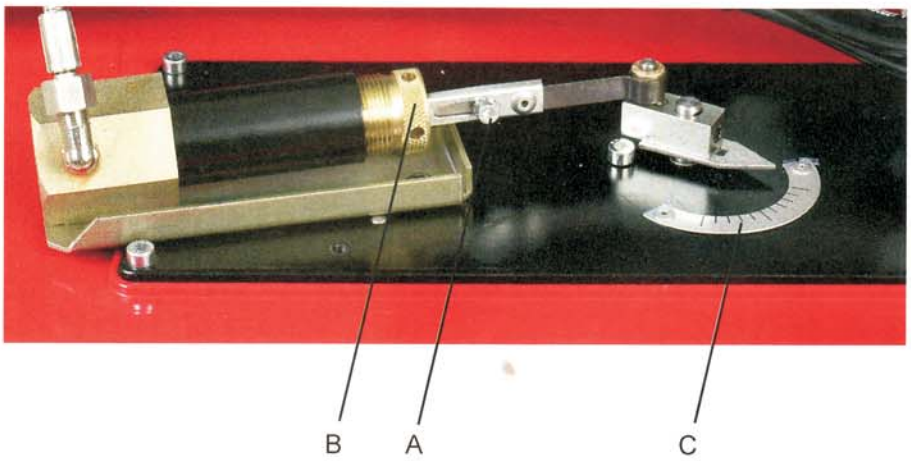
First stage:

Set the operating switch (S2) on low capacity (I). Loosen the screw (A) and turn the damper to the position wanted. Tighten the screw (A) again.

Second stage:

Set the operating switch (S2) on high capacity (II). Screw the knurled ring (B) in (reduce) or out (increase). The position of the damper can be read on the damper scale (C).

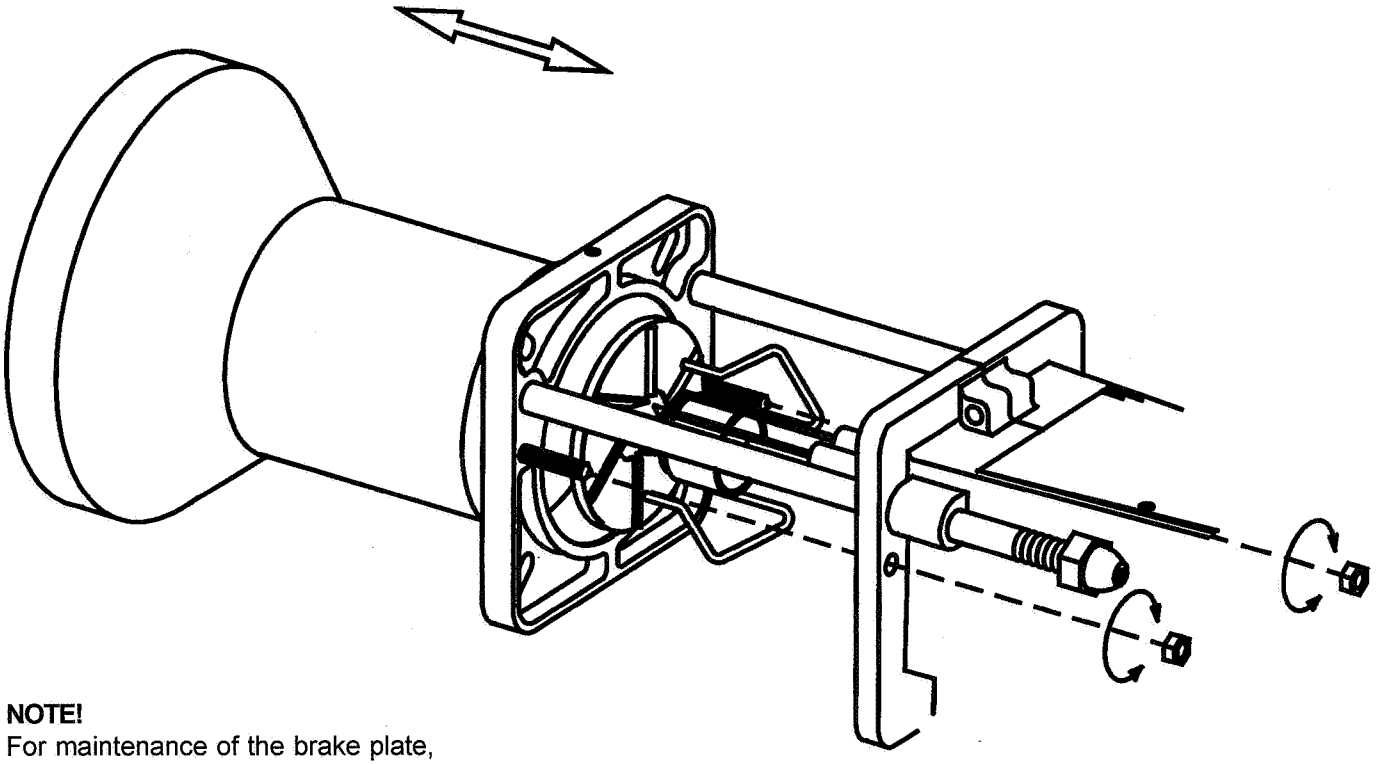
Check the air adjustment by making a flue gas analysis.



MAINTENANCE OF OIL BURNER

Warning: Before doing any service switch off power at the main switch and cut off the oil supply.

SERVICE OF BURNER HEAD

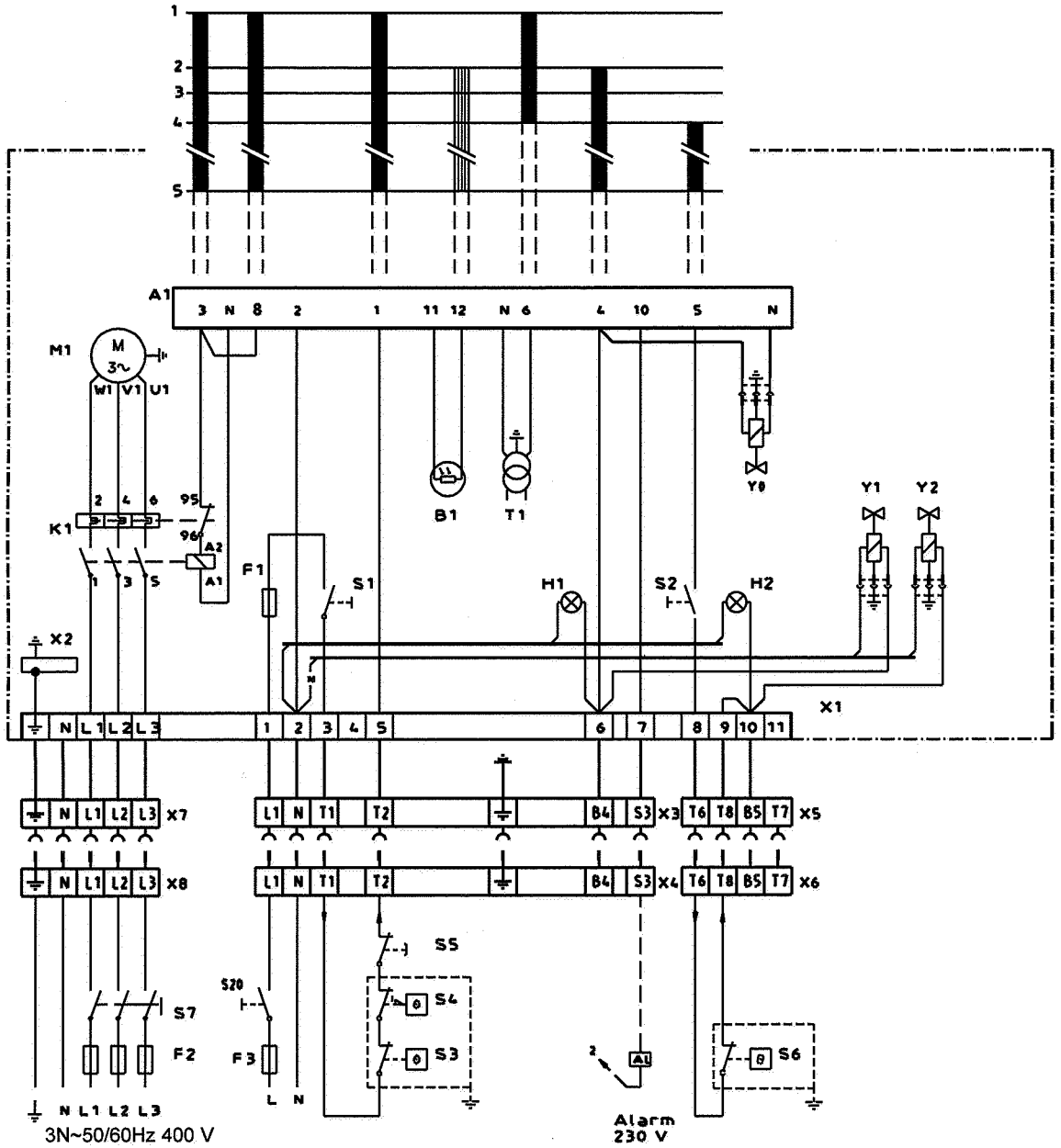


NOTE!
For maintenance of the brake plate, nozzles, electrodes etc, when using a long design of the burner tube, you have to **remove the nozzle assembly from the connecting pipe and move the assembly backwards** in the fan housing (from the boiler).

ELECTRIC EQUIPMENT

OIL BURNER CONTROL: LMO24.255.B2B/LOA44

WIRING DIAGRAM



LIST OF COMPONENTS

A1	Oil burner control
B1	Photoresistor
F1	Operating fuse
F2	Fuse
F3	Fuse
H1	Lamp, low capacity
H2	Lamp, high capacity
K1	Thermal overload protection
M1	Burner motor
S1	Operating switch
S2	Operating switch, high/low capacity
S3	Control thermostat
S4	Temperature limiter
S5	Micro switch for hinged door
S6	Control thermostat, high/low capacity
S7	Main switch
S20	Main switch
T1	Ignition transformer
X1	Connection terminal board
X2	Earth terminal
X3	Plug-in contact "Euro", burner
X4	Plug-in contact "Euro", boiler
X5	Plug-in contact "Euro", high/low burner
X6	Plug-in contact "Euro", high/low boiler
X7	Plug-in contact "Euro" 3-phase, burner
X8	Plug-in contact "Euro", 3-phase, boiler
Y0	Solenoid valve start
Y1	Solenoid valve 1
Y2	Solenoid valve 2

If S6 is missing connection between T6 and T8.

Mains connection and fuse in accordance with local regulations.

ELECTRIC EQUIPMENT

OIL BURNER CONTROL: LMO24.255.B2B

FUNCTION

1. Switch on operating switch and twin thermostat
   The burner motor starts, an ignition spark is formed, 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.

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. Full load thermostat ON
   The burner is in operating position and can now change between high and low capacity.

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.

TECHNICAL DATA

Pre-ignition time:	25 s
Pre-purge time:	25 s
Post-ignition time:	5 s
Safety lock-out time:	5 s
Reaction time on flame failure:	max. 1 s
Ambient temperature:	from - 20 to +60°C
Min. current with flame established:	30 µ A
Max. photo current at start:	5,5 µ A
Enclosure:	IP 40

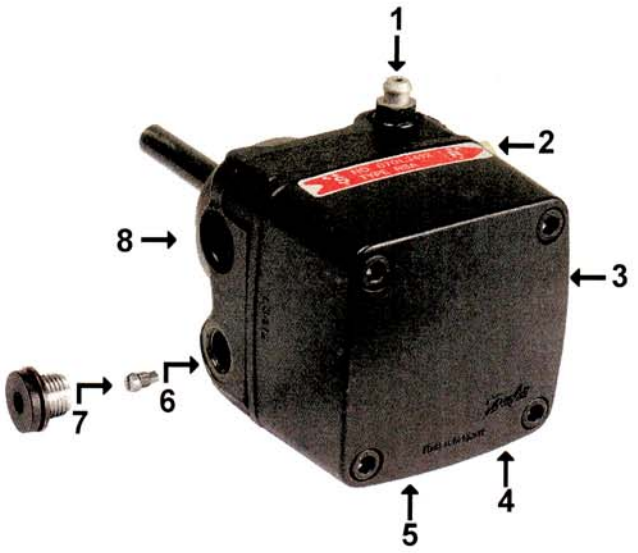
CONTROL OF PHOTO CURRENT

Current through photo unit is measured with a d.c. ammeter (a moving coil instrument connected in series with the photo unit).

INSTRUCTIONS PUMP TYPE DANFOSS RSA 125

TECHNICAL DATA

Viscosity range:	1,3-18,0 mm²/s
Pressure range:	12,0-21,0 bar
Oil temperature:	-10 to +70°C



COMPONENTS

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

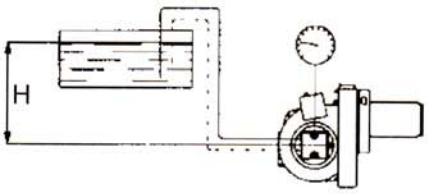
SUCTION LINE TABLES

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

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

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

The tables state the total suction line length in metres at a viscosity of 6,0 mm²/s.



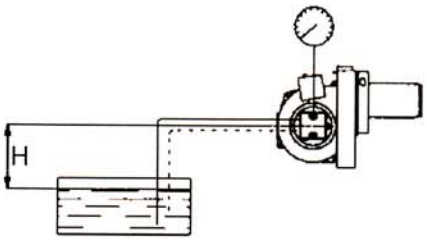
1-pipe system

Height	Pipe diameter			
H	ø10mm	ø12mm	ø15mm	ø20mm
m	m	m	m	m

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

Two-pipe system

Height	Pipe diameter			
H	ø10mm	ø12mm	ø15mm	ø20mm
m	m	m	m	m
4,0	39	81	100	100
3,5	36	76	100	100
3,0	34	71	100	100
2,5	32	66	100	100
2,0	29	61	100	100
1,5	27	56	100	100
1,0	25	51	100	100
0,5	22	46	100	100



1-pipe system

Height	Pipe diameter			
H	ø10mm	ø12mm	ø15mm	ø20mm
m	m	m	m	m

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

Two-pipe system

Height	Pipe diameter			
H	ø10mm	ø12mm	ø15mm	ø20mm
m	m	m	m	m
0	20	41	100	100
-0,5	18	36	89	100
-1,0	15	31	77	100
-1,5	13	26	65	100
-2,0	10	22	53	100
-2,5	8	17	41	100
-3,0	6	12	29	91
-3,5	3	7	17	53
-4,0	1	2	5	15

PURGING

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

FUNCTION DANFOSS
RSA 95 - 125

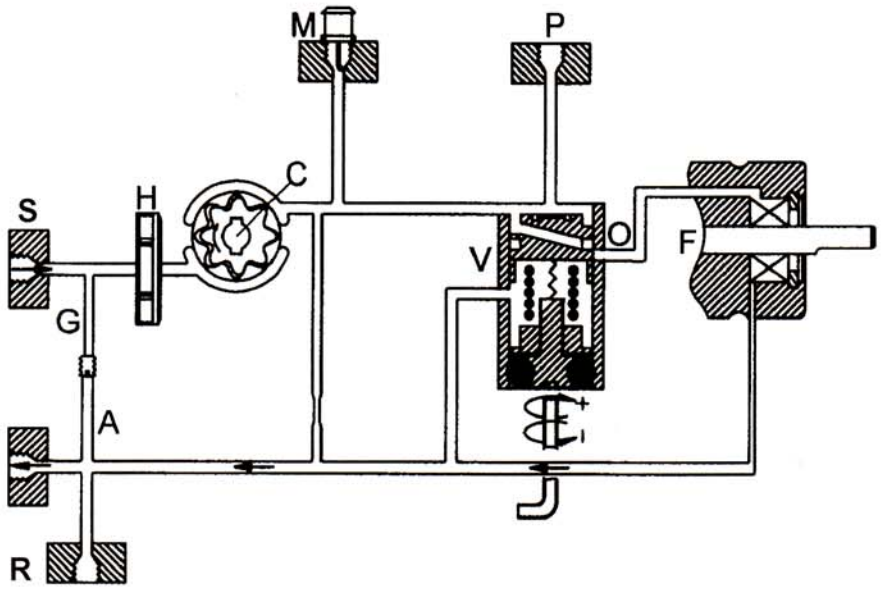
When the pump is started oil is drawn through the suction port "S" via filter "H" to the suction side of the gearwheel set "C". From here the gearwheel set pumps the oil to the pressure side and at the same time the oil becomes pressurized. The oil is led to cut-off and regulating valve "V" which opens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

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

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

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

When the pump is stopped, the pump



output drops and produces a drop in the oil pressure. The spring in the regulating valve presses the regulating piston forward until it seals in port "P". This cuts off the oil flow to the nozzle and ensures that the nozzle line is effectively shut off.

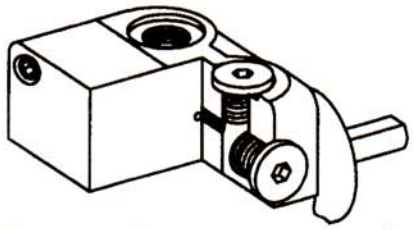
If the pump is overloaded, i.e. more oil is demanded than the gearwheel is able to pump under the given conditions, the oil pressure falls below the set value because the piston of the regulating valve moves towards its closed position and partially or wholly cuts off the return oil via port "O".

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

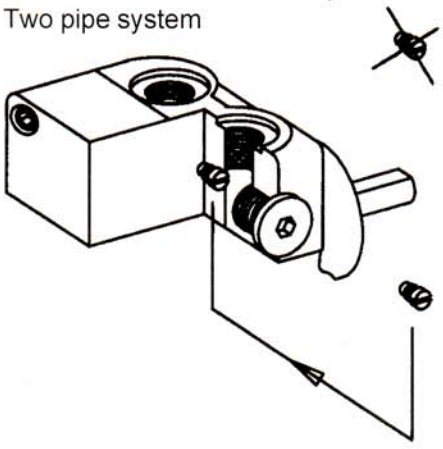
MOUNTING/DISMOUNTING BY-PASS PLUG

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

One pipe system

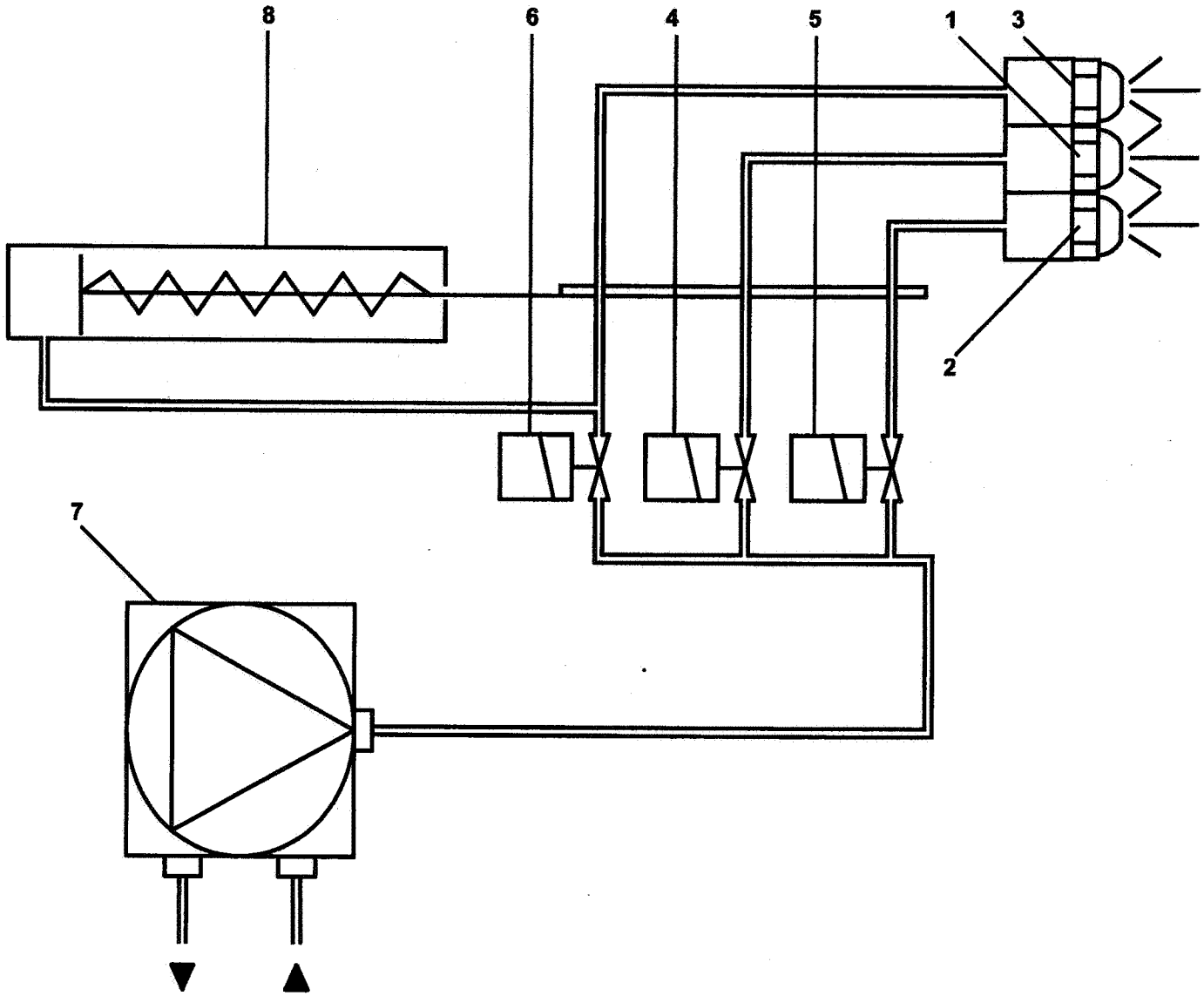


Two pipe system



EXCHANGE OF FILTER

FUNCTION FOR DANFOSS RSA



1. Nozzle 1
2. Nozzle 2
3. Nozzle 3
4. Solenoid valve Nozzle 1
5. Solenoid valve Nozzle 2
6. Solenoid valve Nozzle 3
   and adjustment of air Stage 2
7. Oil pump
8. Air adjustment Stage 2

N.B. Nozzle 1+2= 1st Stage
Nozzle 1+2+3= 2nd Stage

NOZZLE TABLE

Pump pressure bar

Gph	10			11			12			13			14			15			16			17		
	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	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	4,40	52	45	4,56	54	46	4,71	56	48	4,85	57	49
1,10	4,09	48	42	4,29	51	44	4,48	53	46	4,67	55	48	4,84	57	49	5,01	59	51	5,18	61	53	5,34	63	54
1,20	4,47	53	46	4,68	55	48	4,89	58	50	5,09	60	52	5,29	63	54	5,47	65	56	5,65	67	58	5,82	69	59
1,25	4,65	55	47	4,88	58	50	5,10	60	52	5,30	63	54	5,51	65	56	5,70	68	58	5,89	70	60	6,07	72	62
1,35	5,02	59	51	5,27	62	54	5,50	65	56	5,73	68	58	5,95	70	61	6,15	73	63	6,36	75	65	6,55	78	67
1,50	5,58	66	57	5,85	69	60	6,11	72	62	6,36	75	65	6,60	78	67	6,83	81	70	7,06	84	72	7,27	86	74
1,65	6,14	73	63	6,44	76	66	6,73	80	69	7,00	83	71	7,27	86	74	7,52	89	77	7,77	92	79	8,01	95	82
1,75	6,51	77	66	6,83	81	70	7,14	85	73	7,42	88	76	7,71	91	79	7,97	95	81	8,24	98	84	8,49	101	87
2,00	7,45	88	76	7,81	93	80	8,16	97	83	8,49	101	87	8,81	104	90	9,12	108	93	9,42	112	96	9,71	115	99
2,25	8,38	99	85	8,78	104	90	9,18	109	94	9,55	113	97	9,91	118	101	10,26	122	105	10,60	126	108	10,92	130	111
2,50	9,31	110	95	9,76	116	100	10,19	121	104	10,61	126	108	11,01	131	112	11,39	135	116	11,77	140	120	12,13	144	124
2,75	10,24	121	104	10,73	127	109	11,21	133	114	11,67	138	119	12,11	144	123	12,53	149	128	12,95	154	132	13,35	158	136
3,00	11,16	132	114	11,71	139	119	12,23	145	125	12,73	151	130	13,21	157	135	13,67	162	139	14,13	168	144	14,56	173	148
3,50	13,03	154	133	13,66	162	139	14,27	169	146	14,85	176	151	15,42	183	157	15,95	189	163	16,49	196	168	16,99	201	173
4,00	14,89	176	152	15,62	185	159	16,31	193	166	16,97	201	173	17,62	209	180	18,23	216	186	18,84	223	192	19,42	230	198
4,50	16,75	199	171	17,57	208	179	18,35	218	187	19,10	226	195	19,82	235	202	20,51	243	209	21,20	251	216	21,84	259	223
5,00	18,62	220	190	19,52	231	199	20,39	242	208	21,22	252	216	22,03	261	225	22,79	270	232	23,55	279	240	24,27	288	247
5,50	20,48	243	209	21,47	255	219	22,43	266	229	23,34	277	238	24,23	287	247	25,07	297	256	25,91	307	264	26,70	317	272
6,00	22,34	265	228	23,42	278	239	24,47	290	250	25,46	302	260	26,43	313	270	27,49	326	280	28,27	335	288	29,13	345	297
6,50	24,20	287	247	25,37	301	259	26,51	314	270	27,58	327	281	28,63	340	292	29,63	351	302	30,62	363	312	31,55	374	322
7,00	26,06	309	266	27,33	324	279	28,55	339	291	29,70	352	303	30,84	366	314	31,91	378	325	32,98	391	336	33,98	403	347
7,50	27,92	331	285	29,28	347	299	30,59	363	312	31,83	377	325	3,04	392	337	34,19	405	349	35,33	419	360	36,41	432	371
8,00	29,79	353	304	31,23	370	318	32,63	387	333	33,95	403	346	35,25	418	359	36,47	433	372	37,69	447	384	38,80	460	396
8,50	31,65	375	323	33,18	393	338	34,66	411	353	36,07	428	368	37,45	444	382	38,74	459	395	40,04	475	408	41,26	489	421
9,00	33,59	398	343	35,14	417	358	63,71	435	374	38,19	453	389	39,65	470	404	41,02	486	418	42,40	503	432	43,69	518	446
9,50	35,37	419	361	37,09	440	378	38,74	549	395	40,31	478	411	41,85	496	427	43,30	514	442	44,75	531	456	46,11	547	470
10,00	37,23	441	380	39,04	463	398	40,78	484	416	42,44	503	433	44,06	523	449	45,58	541	465	47,11	559	480	47,11	559	480
11,00	40,96	486	418	42,94	509	438	44,86	532	457	46,68	554	476	48,46	575	494	50,14	595	511	51,82	615	528	53,40	633	545
12,00	44,68	530	456	46,85	556	478	48,94	580	499	50,92	604	519	52,87	627	539	54,70	648	558	56,53	670	576	58,25	691	594
14,00	52,12	618	531	54,65	648	557	57,10	677	582	59,41	705	606	62,68	732	629	63,81	757	651	65,95	778	669	67,96	806	693
16,00	59,57	706	607	62,46	741	637	65,26	774	666	67,90	805	692	70,49	836	719	72,93	865	744	75,38	894	769	77,67	921	792
18,00	67,02	795	683	70,27	833	717	73,41	871	749	76,39	906	779	79,30	940	809	82,05	973	837	84,80	1006	865	87,38	1036	891
20,00	74,47	883	759	78,08	926	796	81,57	967	832	84,87	1007	865	88,11	1045	899	91,17	1081	930	94,22	1117	961	97,09	1151	990
22,00	81,91	971	835	85,89	1019	876	89,73	1064	915	93,36	1107	952	96,92	1149	988	100,28	1189	1023	103,64	1229	1057	106,79	1267	1089
24,00	89,36	1060	911	93,70	1111	956	97,88	1161	998	101,85	1208	1039	105,74	1254	1078	109,40	1297	1116	113,06	1341	1153	116,50	1382	1188
26,00	96,81	1148	987	101,50	1204	1035	106,04	1258	1081	110,33	1308	1125	114,55	1359	1168	118,52	1406	1209	122,49	1453	1249	126,21	1497	1287

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

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FAULT LOCATION

BURNER FAILS TO START

Situation	Possible causes	Remedies
Motor runs Burner pre-purges Flame occurs Burner locks out	Flame instabillity	
	Incorrect head settings	Check nozzle to burner head dimension and electrode position
	Low oil pressure	Check oil pressure
	Excess air	Adjust air damper
	Photocell not seeing light	Check that photocell is clean and unobstructed
	Photocell failed	Confirm with new photocell
Motor runs	Control faulty	Confirm with new control. (NB. it is advisable to change the photocell if also changing control)
Burner pre-purges No flame occurs Burner locks out	False light	Check that photocell is not seeing ambient light
	No spark	Check that H.T. leads are sound and are not arcing other than at electrode gap
	No oil	Check oil supply to burner - check that pump is not airlocked
		Check operation of magnetic valve

BURNER FAILS TO START AFTER NORMAL OPERATION

Burner fails to start Lamp not lit	Fuse has blown	Check or replace fuse if necessary. Check reason for failure
	Appliance thermostat has not reset	Adjust thermostat
	Appliance overheat device has operated	Reset overheat device. Find reason for its operation and rectify
	Control relay or photocell defective	Check by replacement
Motor runs Burner runs to lockout	No oil being delivered	Check that tank, oil lines, fire valve, pump and nozzle are all in good order
	Excessive flue draught is preventing flame establishment	Rectify condition
	No spark	Check ignition transformer. Check electrode gap and porecelains

DELAYED IGNITION, BURNERS STARTS VIOLENTLY

Burner pulsates on start-up only with hot flue	Excessive draught	Recommission burner
Burner pulsates on start-up	Nozzle partly blocked	Replace nozzle
	Oil pressure too low	Check and recommission
	Flue blocked or damaged	Check and rectify
	Fan slipping on shaft	Check and retighten
	Pump coupling loose or worn	Check and replace
Burner starts violently	Delayed ignition	Check the electrode adjustment, see diagram
		Check electrodes for damage
		Check H.T. leads for damage and disconnection

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