178 056 56-7 2019-06-05

Installation and Maintenance instruction

B40 MF, B45-2 MF

Bentone®

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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 60

- 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 thedesign 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

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 h Change
Oilhose	1 year control/change	
Nozzle	1 year change	3000h Change
Electrods	1 Year Change /cleaning	3000h Change /cleaning
Brake plate	1 Year Change /cleaning	3000h Change /cleaning
Motor	1 year	3000 hrs
Cuppling chaft	1 year control/change	3000h control/change
Fan wheel	“1 Year Change when dirty / unbalance”	“3000h Change when dirty / unbalance”
Pressure piston max. load Pressure piston min. load	Regular checks of seal and function every 3 month. Change at leakage.	Control 2000 hrs

Component replacement intervals

Components	Service life – Recommended replacement	Service life – Recommended replacement Operating starts
Control system	10 years	250,000 starts
Pressure switch	10 years	250,000 starts
Flame guard	10 years	250,000 starts
UV flame sensor	10000 hrs	N/A
Damper motor		500 000 starts
Contaktor	10 years	500,000 starts
Gas valve with seal testing	Replacement upon fault detection	N/A
Gas pressure switch	10 years	250,000 starts
Safety blow-off system	10 years	N/A
Damper motor	N/A	500,000 starts
Contactor	10 years	500,000 starts
Pressure piston max. load, Pressure piston min. load + O-ring Valve seat	10 years	80 000 starts

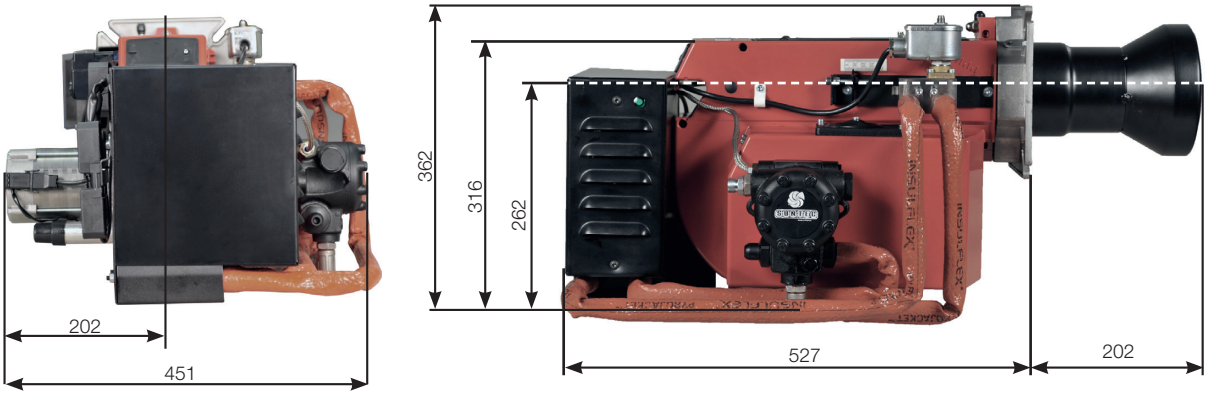
The burner and its components must be recycled according to applicable regulations.

Delivery check

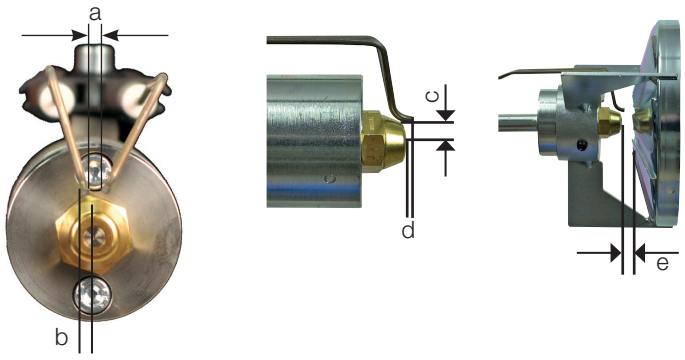
- Make sure everything is delivered and the goods have not been damaged during transit.
- If something is wrong with a delivery, report it to the supplier.
- Transport damage must be reported to the shipping company.

1. TECHNICAL DATA

1.1 Dimensions B40



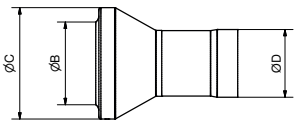
1.2 Setting of ignition electrodes and brake plate



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

	a	b	c	d	e
B40 MF	2,5-3,0	2,0	6,5-7,0	2,0	5,0

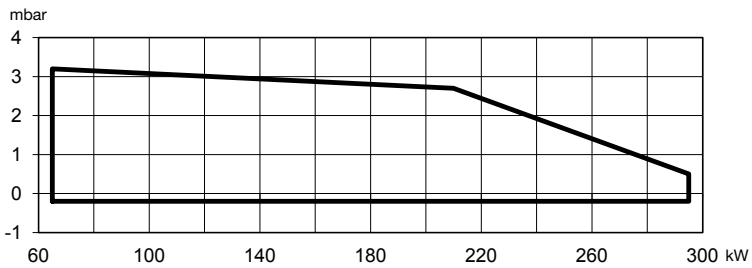
B40 MF	Insertion length, burner tube	Burner tube, Dimension B	Burner tube, Dimension C	Burner tube, Dimension D
Standard 1	202	115	160	114



1.1.1 Burner output

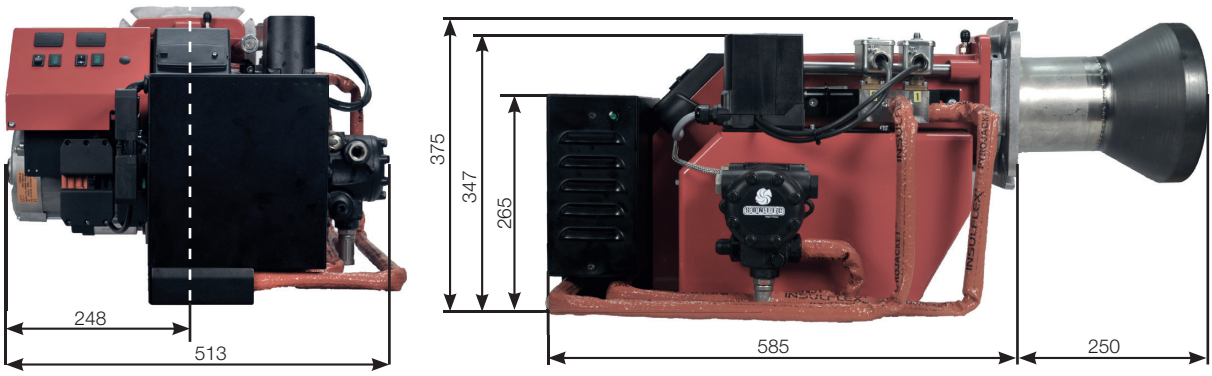
6.5 - 29.5 kg/h

65 - 295 kW

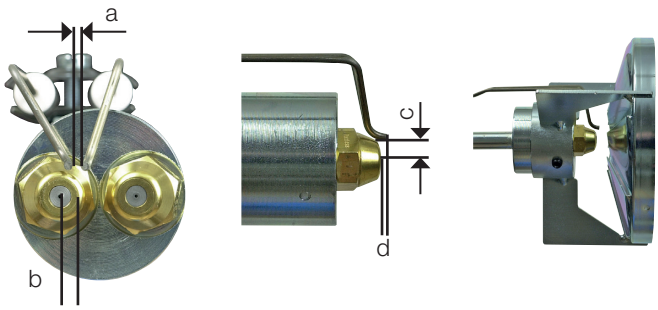


* Used lower calorific value of 10.00 kWh/kg for rapeseed oil in accordance with DIN 51605:2010-10

1.3 Dimensions B45-2



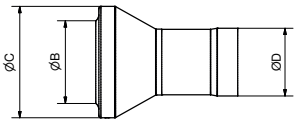
1.4 Setting of ignition electrodes and brake plate

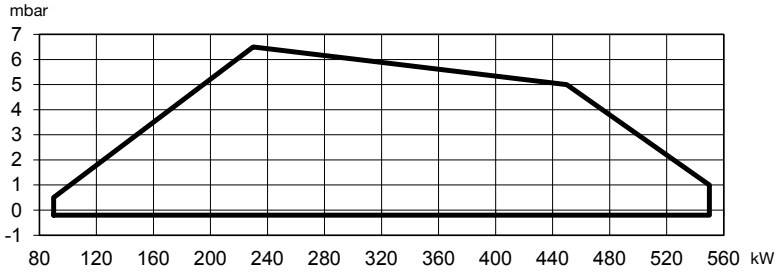


*NB It is important that the spark does not strike against the brake plate or nozzle

	a	b	c	d	e
B45-2 MF	2,5-3,0	2,0	6,5-7,0	2,0	6,0

B45-2 MF	Insertion length, burner tube	Burner tube, Dimension B	Burner tube, Dimension C	Burner tube, Dimension D
Standard 1	250	160	220	134





1.2.1 Burner output

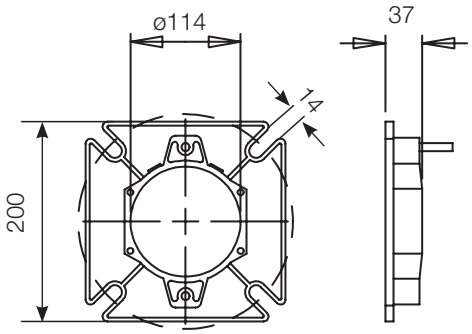
9.0 - 55.0 kg/h

90 - 550 kW

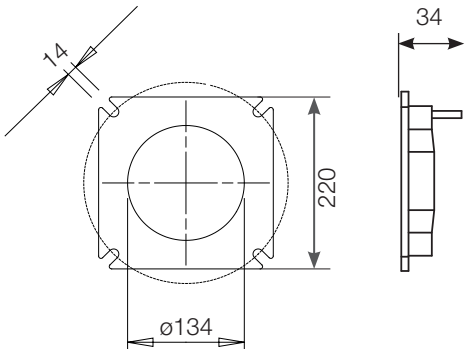
* Used lower calorific value of 10.00 kWh/kg for rapeseed oil in accordance with DIN 51605:2010-10

1.5 Dimensions, flange

B40 MF



B45-2 MF



1.6 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/semi-solid
	60° Solid/semi-solid
	80° Solid/semi-solid
Pump pressure	28 bar (24-28 bar)[1)]
	24 bar (20-28 bar)[2)]

[1)] high viscosity oils
[2)] low viscosity oils

The burner pump is factory set at 24 bar and test operated using Roadway 80.

1.7 Oil grades

The burner is tested and approved for pure rapeseed oil that complies with standard DIN 51605:2010-10.

The burner is designed to be able to burn oils with a higher viscosity, both of biological and fossil origin. The maximum viscosity with which the burner is tested is 75 mm²/s, 0–130°c. Another way of defining which kind of oil the burner can handle is that the oil must be of such a nature that it can be pumped by the burner pump at the temperature the oil has at the point of access to the pump.

The burner, without the pump, is designed to withstand the more corrosive environment often created by oils of biological origin.

The Suntec E1069 pump is NOT designed for aggressive oils.

The burner pump has a service life of approx. 3–5 years if the oil is of a grade that complies with standard DIN 51605:2010-10. If oil of a different grade is used, especially if the oil contains contaminants such as particles, press residue, metal swarf etc., or has chemical aggression, the pump may be expected to have a significantly shorter service life.

The pump is considered to be a wearing part and is not covered by the warranty.

Pressure at the pump inlet must be -0.30 to max 2.0 bar. If there is a noise from the pump, the oil is not pumpable at the current temperature or flow. A transport oil pump combined with preheater is then needed to supply the burner's pump with oil for trouble-free operation.

The oil distribution system must be designed with the required equipment such as filters, transport oil pump, preheater and reduction valve to provide trouble -free operation. Max filter size is 120 µm and the oil may need to be filtered in several steps.

In the case of a standstill in which the oil can be expected to change structure, for example aging or phase transitions due to temperature and storage, the burner must be flushed with fuel oil after the standstill. This procedure ensures a good start after standstill.

! Altered structure of the oil can give rise to altered viscosity, pumpabilty and ignitability. This can cause the pump, valves and nozzles to get blocked

1.9 Nozzle for bio oils, 20-28 bar

Pump pressure bar

Gph	20		22		24		26		28	
	kg/h	kW	kg/h	kW	kg/h	kW	kg/h	kW	kg/h	kW
1,00	4,9	49	5,2	51	5,4	53	5,6	56	5,8	58
1,50	7,4	73	7,7	77	8,1	80	8,4	84	8,7	87
2,00	9,8	98	10,3	103	10,8	107	11,2	112	11,6	116
2,50	12,3	122	12,9	128	13,5	134	14,0	140	14,5	145
3,00	14,8	147	15,5	154	16,2	161	16,8	168	17,5	174
3,50	17,2	172	18,0	180	18,9	188	19,6	196	20,4	203
4,00	19,7	196	20,6	206	21,5	215	22,4	224	23,3	232
4,50	22,1	221	23,2	232	24,2	242	25,2	252	26,2	261
5,00	24,6	245	25,8	257	26,9	269	28,0	280	29,1	290
5,50	27,0	270	28,4	283	29,6	296	30,8	308	32,0	320
6,00	29,5	295	30,9	309	32,3	323	33,6	336	34,9	349
6,50	32,0	319	33,5	335	35,0	350	36,4	364	37,8	378
7,00	34,4	344	36,1	361	37,7	377	39,2	392	40,7	407
7,50	36,9	368	38,7	386	40,4	404	42,0	420	43,6	436
8,00	39,3	393	41,3	412	43,1	430	44,9	448	46,5	465
8,50	41,8	418	43,8	438	45,8	457	47,7	476	49,5	494
9,00	44,3	442	46,4	464	48,5	484	50,5	504	52,4	523
9,50	46,7	467	49,0	489	51,2	511	53,3	532	55,3	552
10,00	49,2	491	51,6	515	53,9	538	56,1	560	58,2	581
10,50	51,6	516	54,1	541	56,6	565	58,9	588	61,1	610
11,00	54,1	540	56,7	567	59,3	592	61,7	616	64,0	640
11,50	56,5	565	59,3	593	61,9	619	64,5	644	66,9	669
12,00	59,0	590	61,9	618	64,6	646	67,3	672	69,8	698

Rapeseed oil compliant with DIN 51605:2010-10 Viscosity: 36.0 mm^2/ s, at 40 °C preheater 160 °C

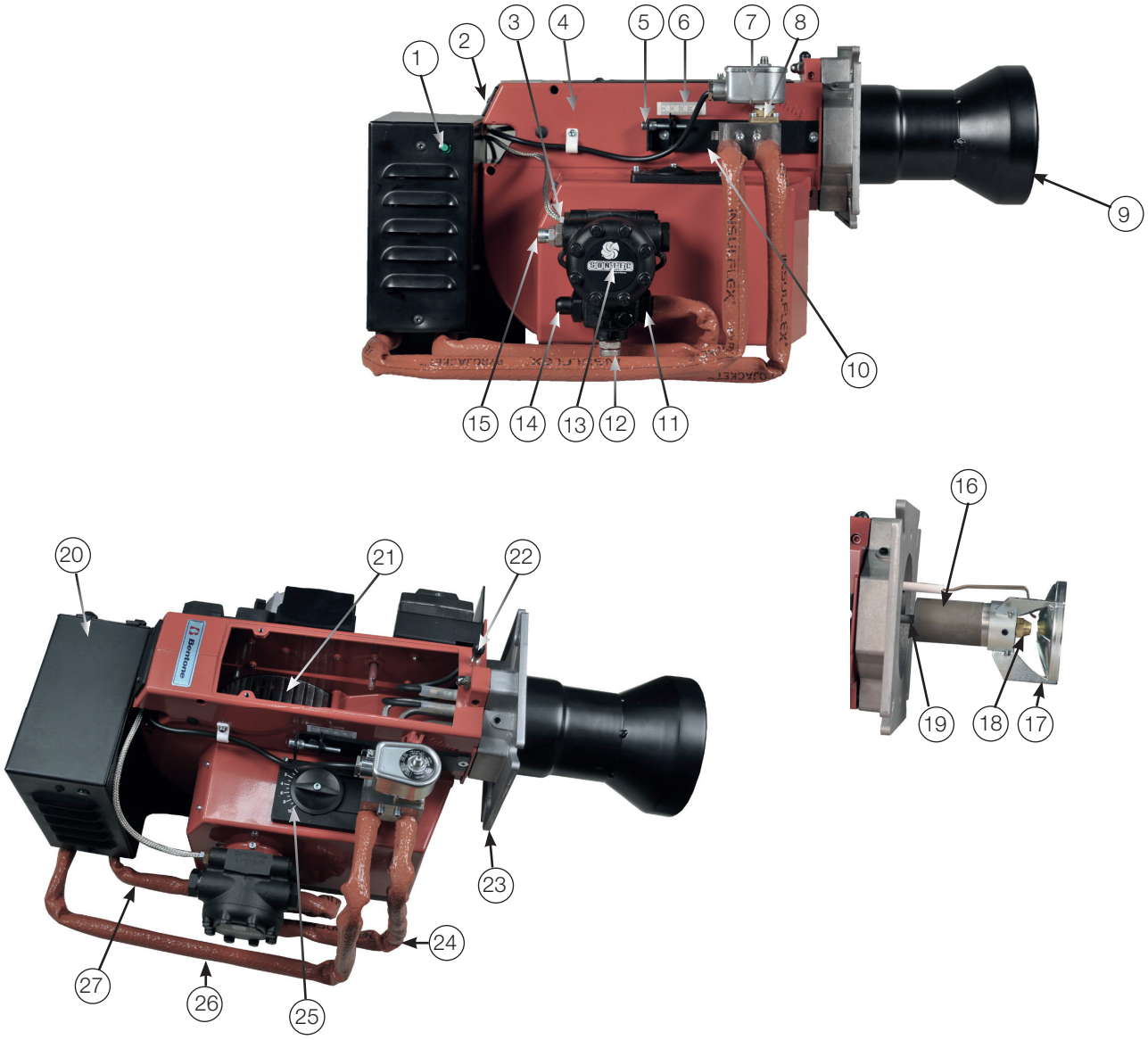
1.10 Nozzle for fossil oils, 22-28 bar

Pump pressure bar

Gph	22		24		26		28	
	kg/h	kW	kg/h	kW	kg/h	kW	kg/h	kW
1,00	5,52	65,44	5,76	68,35	6	71,14	6,22	73,83
1,50	8,66	102,73	9,05	107,3	9,42	111,68	9,77	115,9
2,00	11,01	130,53	11,5	136,33	11,96	141,9	12,42	147,25
2,50	13,78	163,42	14,39	170,69	14,98	117,66	15,55	184,37
3,00	17,21	204,06	17,97	213,13	18,7	221,83	19,41	230,21
3,50	19,13	226,93	19,89	237,02	20,8	246,7	21,59	256,01
4,00	21,06	249,8	22	260,9	22,9	271,56	23,76	281,81
4,50	23,88	283,22	24,94	295,81	25,96	307,89	26,94	319,51
5,00	27,44	325,44	28,66	339,91	29,83	353,79	30,96	367,14
5,50	31	367,66	32,38	384	33,7	399,68	34,97	414,77
6,00	34,71	411,63	36,25	429,94	37,73	447,49	39,16	464,39
6,50	38,71	459,13	40,43	479,55	42,08	499,13	43,67	517,97
7,00	41,38	490,8	43,22	512,62	44,99	533,55	46,69	553,69
7,50	44,2	524,22	46,17	547,53	48,05	569,89	49,86	591,4
8,00	46,72	554,12	48,8	578,76	50,79	602,4	52,71	625,14
8,50	49,1	582,27	51,28	608,16	53,37	632,99	55,39	656,89
9,00	52,51	622,73	54,84	650,42	57,08	676,98	59,24	702,53
10,00	55,92	663,19	58,4	692,68	60,79	720,96	63,08	748,18
11,00	63,04	747,63	65,84	780,87	68,53	812,76	71,12	843,44
12,00	70,75	839,1	73,9	876,41	76,91	912,2	79,82	946,63

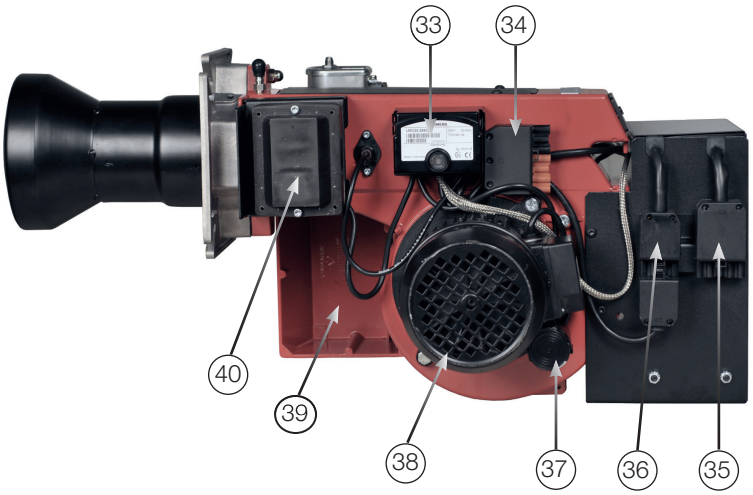
The table applies to oil with a viscosity of 4.4 mm ^{2}/s at a density of 830 kg/m ^{3}.

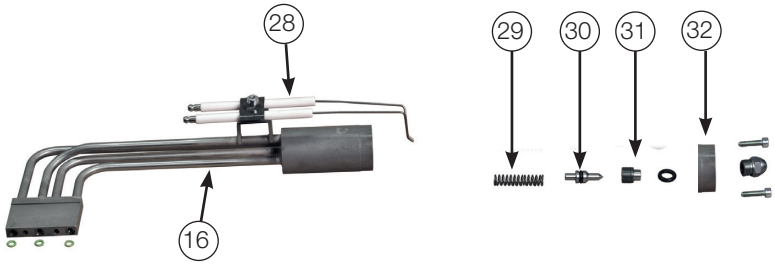
1.11 Description B40 MF

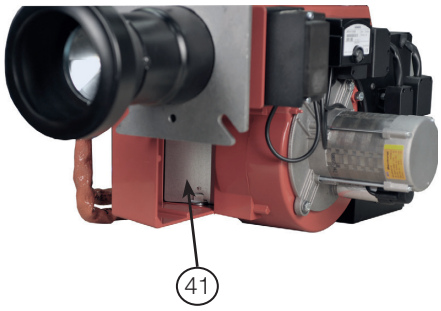


1.11.1 Components B40 MF

1. Indicator lamp, preheater ON
2. Inspection glass
3. Immersion heater, pump
4. Fan housing
5. Nozzle assembly control
6. Scale, nozzle assembly control
7. Solenoid valve NO
8. Valve block
9. Burner tube
10. Cavity immersion heater valve block
11. Pressure outlet pump
12. Return pump
13. Pump
14. Pressure control pump
15. Inlet pump
16. Nozzle assembly
17. Brake plate
18. Nozzle
19. Cavity immersion heater nozzle holder
20. Preheater

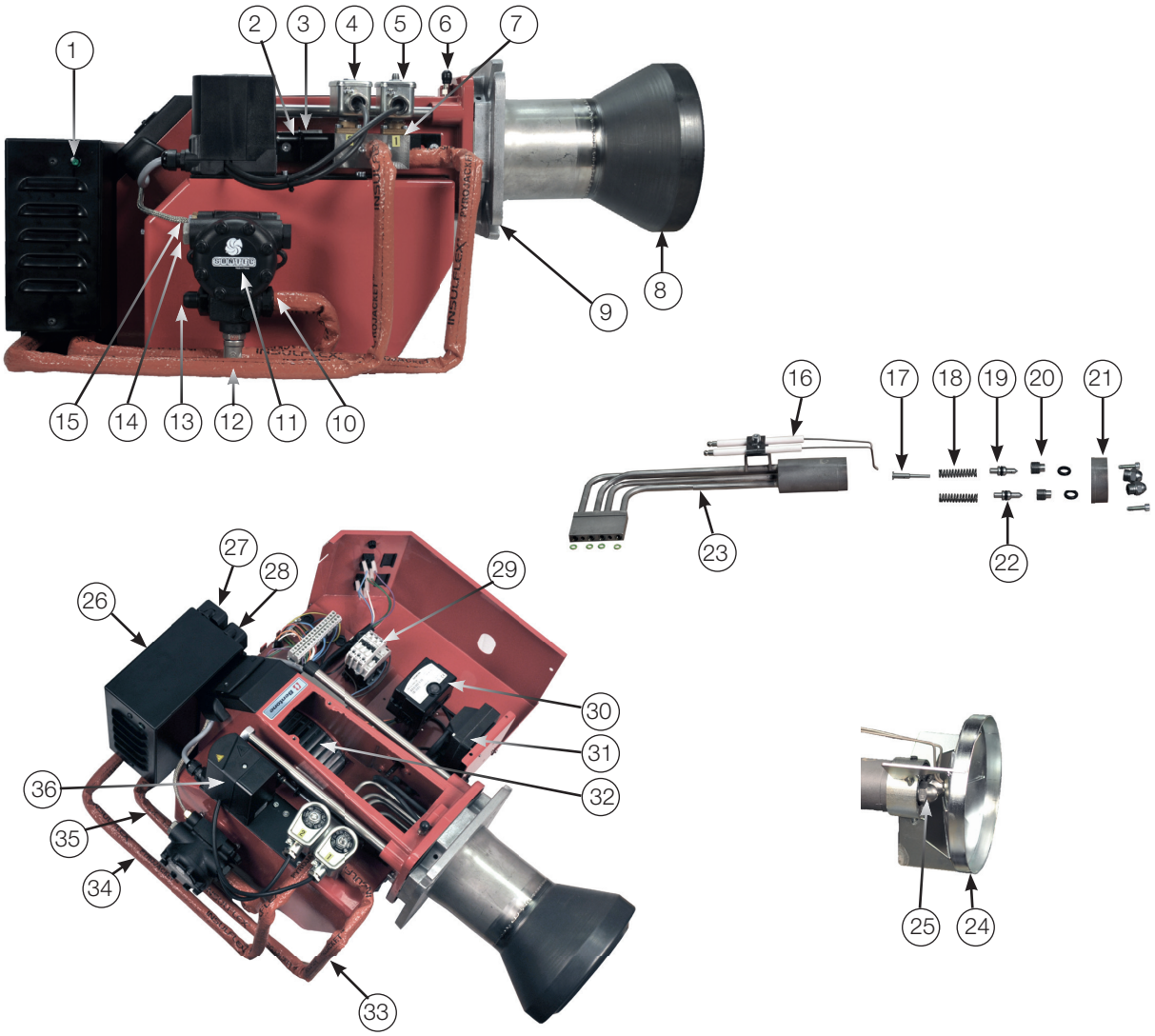






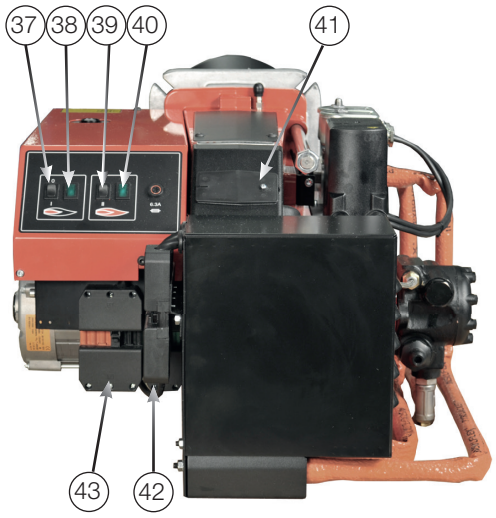
21. Fan wheel
22. Measuring nipple, fan pressure
23. Burner flange
24. Connecting pipe, valve block return
25. Damper motor
26. Connecting pipe, preheater valve block
27. Connecting pipe, pump preheater
28. Ignition electrodes
29. Spring pressure piston
30. Preheater
31. Valve seat
32. Front nozzle holder
33. Relay box
34. 7-pole Europlug (feed)
35. 5-pole Euro plug (feed preheater)
36. 4-pole Euro plug (control signal preheater)
37. Capacitor
38. Motor
39. Air intake
40. Ignition transformer
41. Air damper

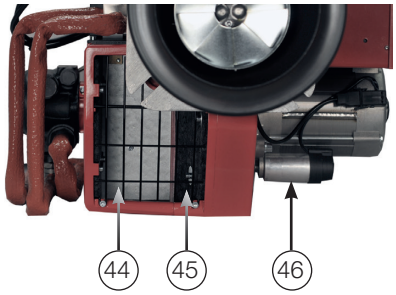
1.12 Description B45-2 MF

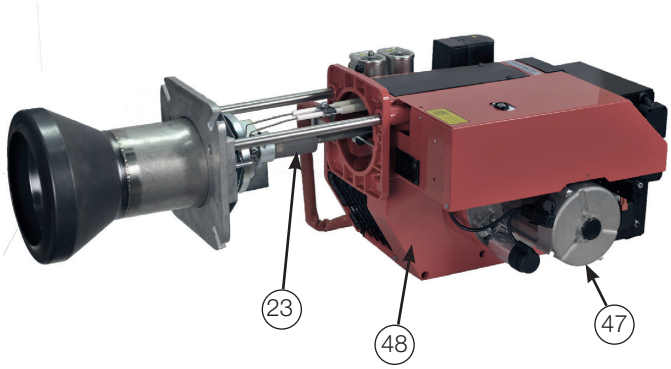


1.12.1 Components B45-2 MF

1. Indicator lamp, preheater ON
2. Nozzle assembly control
3. Scale, nozzle assembly control
4. Solenoid valve NC max. load
5. Solenoid valve NO min. load
6. Measuring nipple, fan pressure
7. Valve block
8. Burner tube
9. Burner flange
10. Pressure outlet pump
11. Pump
12. Return pump
13. Pressure control pump
14. Inlet pump
15. Immersion heater, pump
16. Ignition electrodes
17. Valve needle
18. Spring pressure piston
19. Pressure piston max. load
20. Valve seat
21. Front nozzle holder
22. Pressure piston min. load
23. Air intake
24. Brake plate
25. Nozzle
26. Preheater







27. 5-pole Euro plug (feed preheater)
28. 4-pole Euro plug (control signal preheater)
29. Contactor for motor
30. Relay box
31. Ignition transformer
32. Fan wheel
33. Connecting pipe, valve block return
34. Connecting pipe, preheater valve block
35. Connecting pipe, pump preheater
36. Damper motor
37. Switch 0-I
38. Indicator, min. load
39. Switch I-II
40. Indicator lamp, maximum load
41. Inspection glass
42. 4-pole Euro plug (max. load)
43. 7-pole Euro plug (min. load feed)
44. Air damper
45. Air intake
46. Capacitor
47. Motor
48. Fan housing

2. INSTALLATION

2.1 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.

2.2 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.

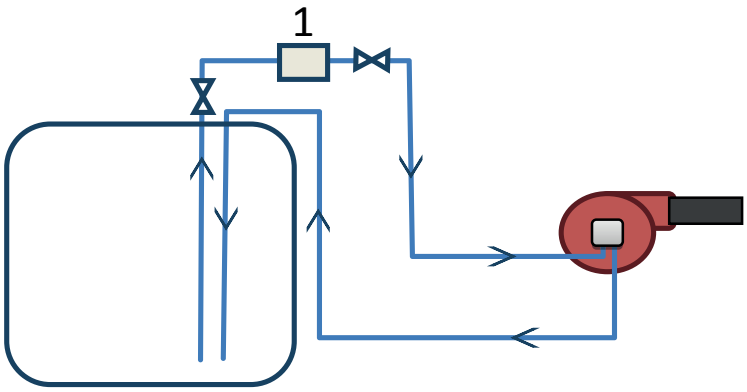
2.3 Distribution of oil

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 ½ " 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. To the suction line on the pump (see paragraph 7.2 pos. 3) should the supplied oil hose with 90° bend be connected.
- Bleed the oil system. The oil pump/oil preheater may be damaged if run dry. The vacuum should not fall below 0 bar in the suction line during start-up.

2.3.1 Proposed pipe routing for oil distribution systems without transport pump

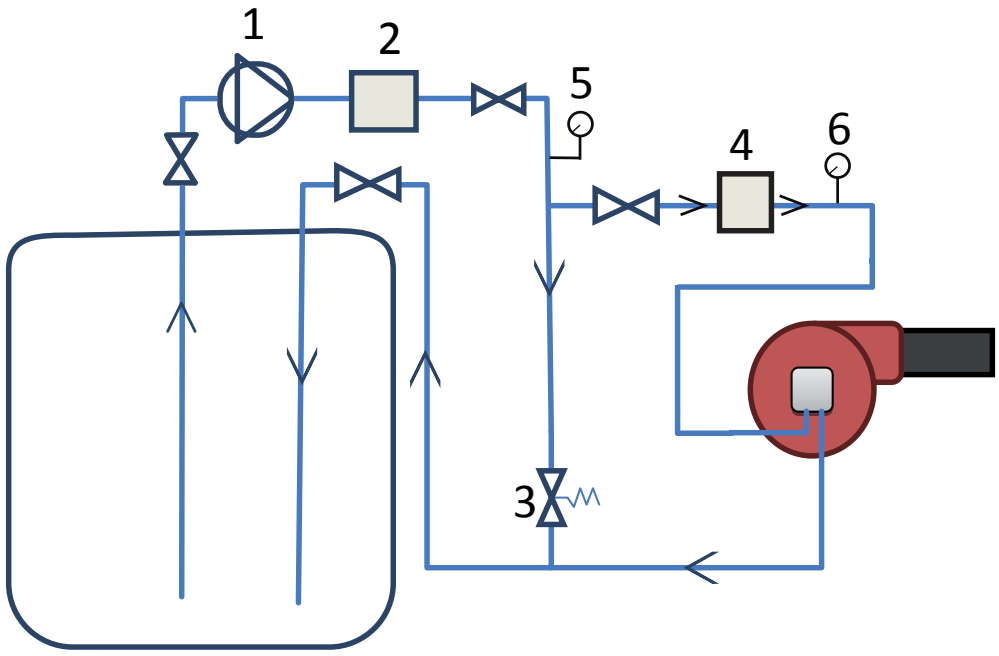
This type of connection should be used only when the oil has a viscosity less than 30 mm²/s



1. Self-cleaning filter

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

2.3.2 Proposed pipe routing for oil distribution systems with transport pump, basket filter and seal filter

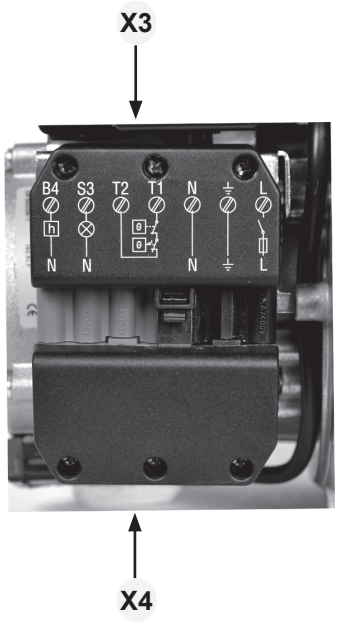


1. Transport oil filter
2. Basket filter
3. Overflow valve 0.5 – 2.0 bar
4. Seal filter
5. Pressure gauge 1
6. Pressure gauge 2

2.4 Electrical connection

Before electrical installation begins, the main power switch must be turned off. If the boiler has a 7-pole and a 4-pole Euro plug connector, they will usually connect directly to the burner. Otherwise, use the supplied connectors. The 5-pole connector supplies the burner preheater with a separate 3-phase supply. See connection under Electrical equipment.

1. Switch off the main switch.
2. Connect the Euro plugs. (See Electrical equipment)
3. Make sure the burner operations switch (S1) is off.
4. Turn on the main switch.



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

2.5 Nozzle selection

See under Technical data: Recommended nozzle and Nozzle table.
If, after selecting the nozzle, burner type B45-2 MF has difficulty starting, this may in some cases be due to the selection of nozzle made for the first stage. Selecting a nozzle with a smaller effect in the first stage may solve the problem.

2.6 Setting of brake plate and air flow

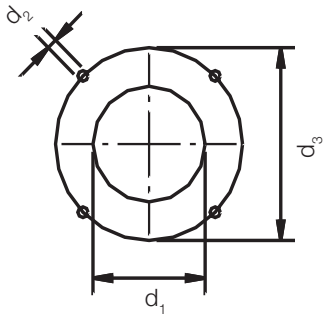
Prior to commissioning, the basic settings of the burner can be set in accordance with the diagram. See under Basic settings. Note that it is simply a matter of a basic setting that should be adjusted retrospectively once the burner has started. You should then conduct a flue gas analysis and soot quantity measurement.

2.7 Burner installation

2.7.1 Hole pattern

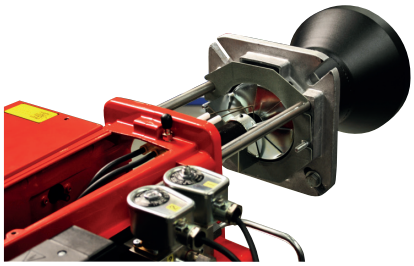
Make sure the hole pattern on the boiler is designed for burner flange.

Combustion device	d_1	d_2	d_3
B40 MF	ø 115-175	M10-M12	ø 195-245
B45-2 MF	ø 135-(175) 200	M10-M12	ø (195) 224-260



2.8 Burner installation

1. Separate the burner body and the flange.
2. Remove the brake plate from the oil pipe.
3. Install the selected nozzle. (See Technical data)
4. Install the brake plate on the oil pipe
5. Remove the burner tube from the flange.
6. Install the flange with gasket on the boiler.
7. Install the burner tube on the flange. Make sure that the hole in the front of the burner tube pipe is pointing down. This allows any drops of oil to flow out.
8. Insulate between the burner and boiler door to reduce radiated heat.
9. • Fit the burner body on the flange, B40 MF
   • Slide the burner body on the guides, B45-2 MF
10. Lock the burner body using with the nut/nuts.
11. Connect the oil hoses to the pump, see paragraph 2.3
12. Connect burner electrically, see paragraph 2.4



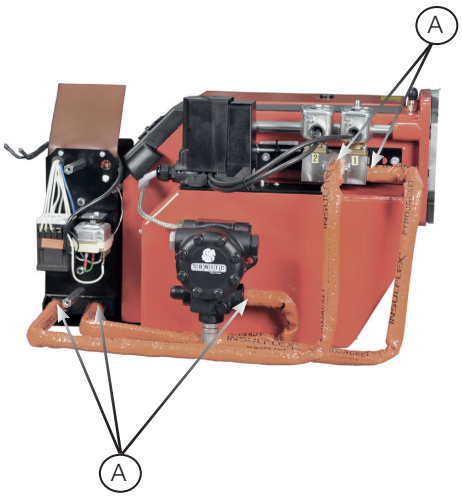
! Because the burner tube must be installed from the inside the boiler, it must be possible to open the boiler or have a hinged flange that is designed so that it can be reconnected with the burner tube installed.

2.9 Check oil line seals

Once the burner has been installed and commissioned, the seals of the various coupling elements should be checked (A). These may, due to temperature fluctuations or transportation, start to leak.

Temperature fluctuations arise from the process of heating oil used in these burners.

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



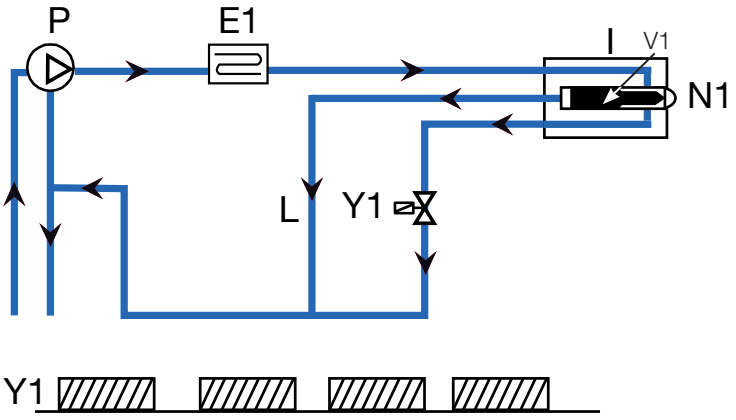
3. FUNCTION DESCRIPTION

3.1 B40 MF 1-stage burner

When the installation calls for heat, the burner's preheater starts to heat the oil. Once the oil reaches the set temperature, the burner receives the signal to start. Hot oil is flushed throughout the burner's oil system.

After the end of the blow period, the solenoid valve (Y1) receives voltage and closes. The oil pressure builds up in the nozzle holder and the cut valve (V1) opens. The oil is atomised in the nozzle and ignited. A small amount of oil and the nozzle assembly compressed air flow is channelled back to the return side of the pump through the leak oil line (L).

Once the installation has reached the desired temperature, a solenoid valve (Y1) is rendered without power and then opened; cut valve (V1) is then closed. This process extinguishes the burner flame. In the same process, oil heating is also interrupted.



P	Oil pump
E1	Preheater
I	Nozzle assembly
L	Leak pipe
N1	Nozzle 1
Y1	Solenoid valve 1 NO
V1	Cut valve

3.2 B45-2 MF 2-stage burner

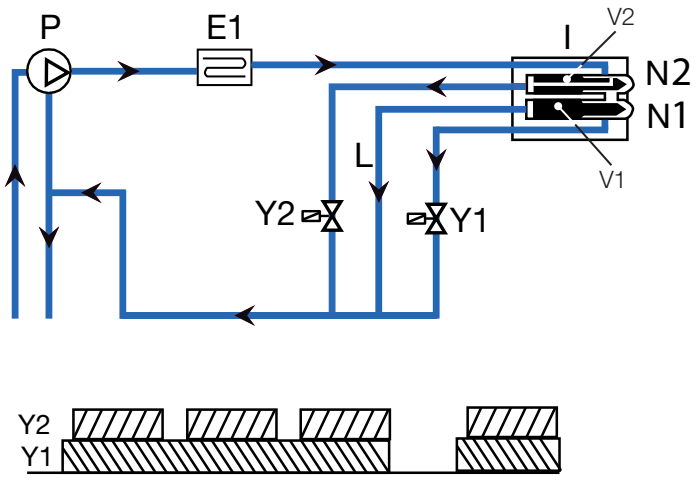
When the installation calls for heat, the burner's preheater starts to heat the oil. Once the oil reaches the set temperature, the burner receives the signal to start. Hot oil is flushed throughout the burner's oil system.

After the end of the blow period, the min. load solenoid valve (Y1) receives voltage and closes. The oil pressure builds up in the nozzle holder and the cut valve (V1) for min. load opens. The oil is atomised in the nozzle (N1) and ignited. A small amount of oil and the nozzle assembly compressed air flow is channelled back to the return side of the pump through the leak oil line (L).

Solenoid valve (Y2) for maximum load opens when the installation calls for maximum load. The pressure difference created over the cut valve (V2) for maximum load makes this valve open. The oil is atomised in the nozzle and ignited.

When the heat in the installation reaches break temperature, solenoid valve (Y2) for maximum load closes to reduce to minimum load. The pressure equalisation which then takes place over the max. load cut valve (V2) gets this to close and the flame is reduced to min. load.

Once the installation has reached the desired temperature, a solenoid valve (Y1) is rendered without power and then opened; cut valve (V1) is then subsequently closed. This process extinguishes the burner flame. In the same process, oil heating is also interrupted.



P	Oil pump
E1	Preheater
I	Nozzle assembly
L	Leak pipe
N1	Nozzle 1
N2	Nozzle 2
Y1	Solenoid valve 1 NO
Y2	Solenoid valve 2 NC
V1	Cut valve 1
V2	Cut valve 2

4. BASIC SETTINGS

4.1 Examples of basic setting B40 MF

Burner output	200 kW
Estimated nozzle output	200 kW/10 kWh/kg*= 20 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	25 bar
Nozzle	3.50 gph
Power in	20.61 kg/h => 20.61 kg/h x 10 kWh/kg* = 206 kW

* Taken from the fuel in accordance with standard DIN 51605:2010-10

Basic settings

The setting value for 200 kW in accordance with basic setting tables. For the correct procedure when implementing settings, see 4.7 Nozzle assembly control, brake plate B40 MF and 4.8 Air setting B40 MF (See technical data)

Effects and nozzle selection from example	
Nozzle assembly	14
Damper	7

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.

4.2 Examples of basic setting B45-2 MF

Burner output	Max. 500 kW
	Min. 200 kW
Estimated nozzle output min. load	200 kW/10 kWh/kg*= 20 kg/h
Estimated nozzle output max. load	(500kW-200 kW)/10 kWh/kg*= 30 kg/h

The nozzle effect is calculated for two-stage burners with two nozzles (separately for each nozzle).

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	25 bar
Nozzle min. load	3.50 gph
Nozzle max. load	5.00 gph
Power in min. load	20.61 kg/h => 20.61 kg/h x 10 kWh/kg* = 206 kW
Power in max. load	20.61 kg/h + 29.44 kg/h => 50.05 kg/h x 10 kWh/kg* = 501 kW

* Taken from the fuel in accordance with standard DIN 51605:2010-10

Basic settings

The setting value for maximum load 500 kW and minimum load 200 kW according to the basic settings tables. For the correct procedure when implementing settings, see 4.7 Nozzle assembly control, brake plate B45-2 MF and 4.9 Air setting B45-2 MF

Damper motor 2-stage (see technical data ...)

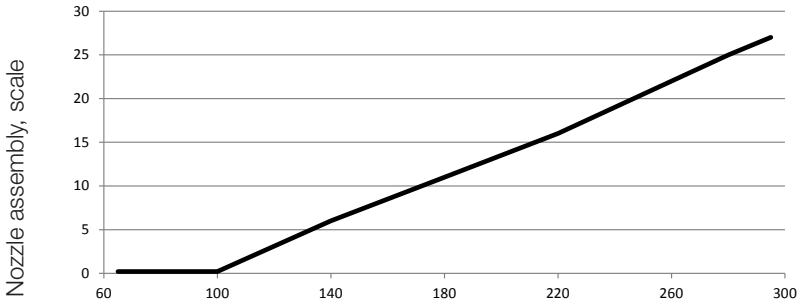
Effects and nozzle selection from example

Nozzle assembly	Stage 2 = 25	
Damper motor	Closed = 0°	Blue cam
	Min. load = 45°	Orange cam
	MV max. load = 60°	Black cam
	Max. load = 90°	Red cam

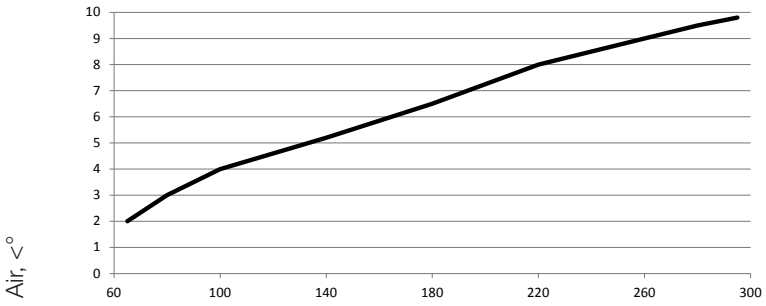
Black cam for MV (solenoid valve) max. load shall be placed between the cams for min. and max. load. The positions of MV max. load are determined by the boiler's characteristics when switching between stages. By default, the black cam is placed between the orange and red cams.

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.

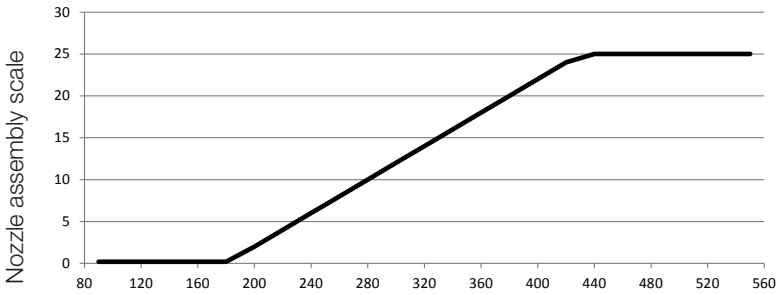
4.3 Setting values for nozzle assembly B40 MF



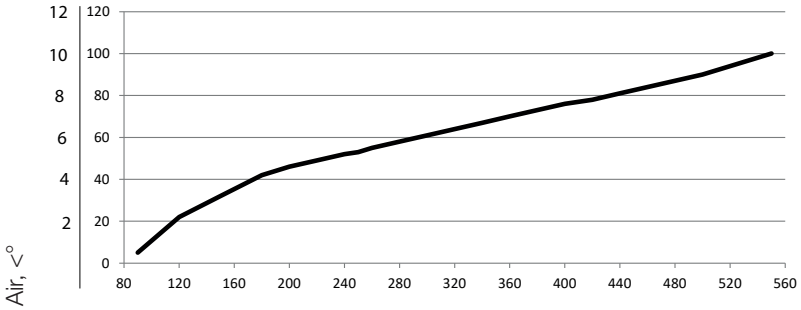
4.4 Setting values for air damper B40 MF



4.5 Setting values for nozzle assembly B45-2 MF

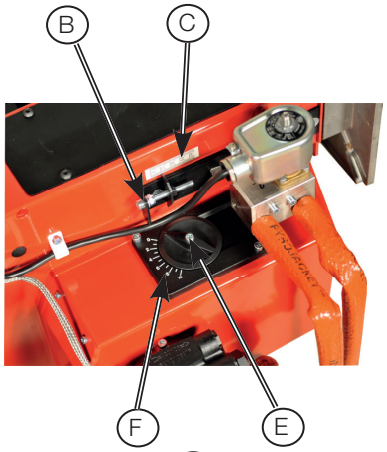


4.6 Setting values for air damper B45-2 MF



4.7 Nozzle assembly control, brake plate

The nozzle assembly control is used to achieve the most favourable pressure drop across the brake plate as possible in the various power stages.



1 nozzle (B40 MF)

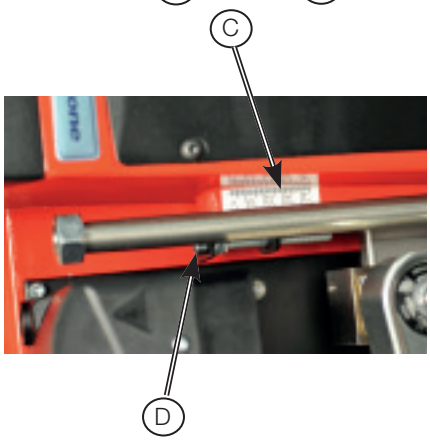
The nozzle assembly control is manually adjusted (B) in order to achieve optimal pressure loss for good combustion.

2 nozzles (B45-2 MF)

The nozzle assembly control is manually adjusted in order to achieve optimal pressure loss for good combustion. Brake plate position is controlled primarily by the second stage effect.

Set the desired position on the scale (C) using the set screw (D) (left turn reduces pressure loss, the brake plate is moved outward).

If pulsation occurs, the changed pressure drop over the brake plate may result in the pulsation stopping



4.8 Air setting B40 MF

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.

4.9 Air setting B45-2 MF Damper motor

The damper motor turns the damper between three pre-set positions. These positions are controlled in the motor by a microswitch, whose switching modes is set using the colour-coded cams. There is also a black cam that controls the engagement of solenoid valve 2 second stage oil.

When the amount of air needs to be changed:
Remove the hood from the damper motor and change the position of the cams by turning them using the included tool. In order for the cam to be inoperative while being turned, we recommend that you switch to a different stage than the one that is to be adjusted and, after making the change, returning to pre-check of the outcome.

Adjustment Stage 1

Set the operations switch to Stage 2 (II).

* Reduce the air volume:
  Turn the orange cam towards 0°.
* Increase the air volume:
  Turn the orange cam towards 90°.

Once the red or orange cam has been moved, check whether the black cam must be changed. The black cam must be between the orange and red cam.
Return the operations switch to Stage 1 and check combustion.

Adjustment Stage 2

Set the operations switch to Stage 1 (I).

* Reduce the air volume:
  Turn red cam towards 0°.
* Increase the air volume:
  Turn red cam towards 90°.

Once the red or orange cam has been moved, check whether the black cam must be changed. The black cam must be between the orange and red cam.
Return the operations switch to Stage 2 and check combustion.

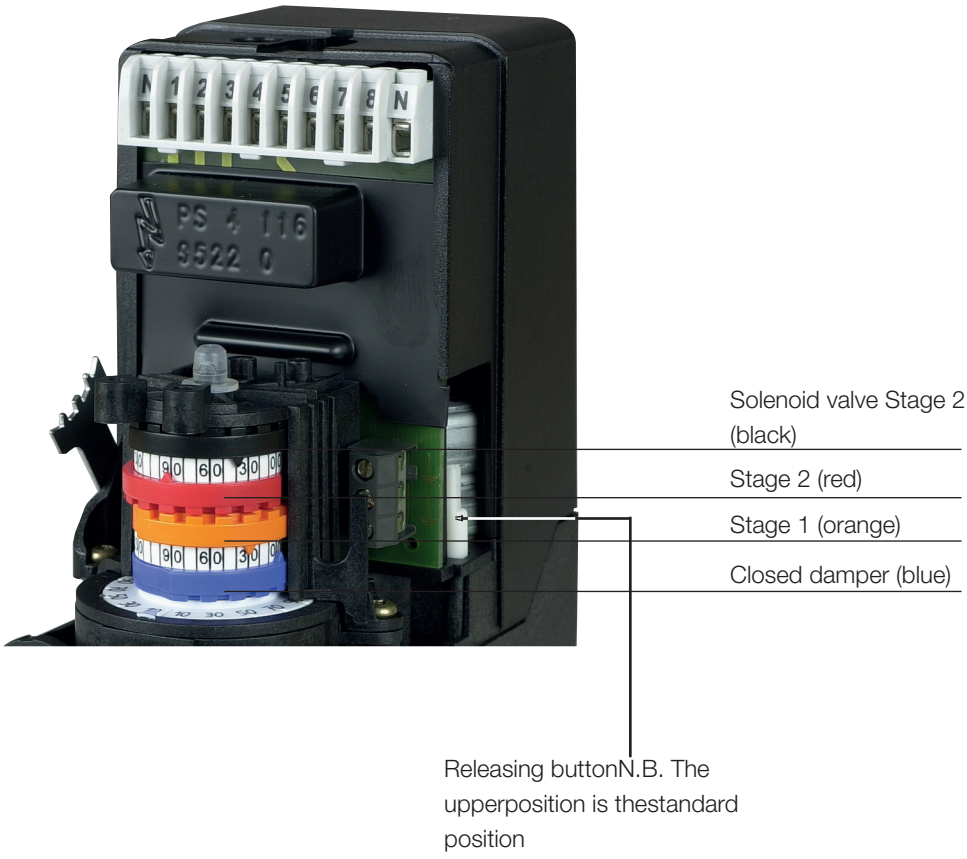
Closed

The blue cam is the limit position for fully closed damper and does not normally need to be changed.

Disconnection

Damper motor can be disengaged using the white disconnection button. This function facilitates the replacement of damper motor.

During disconnection.	Press the white disconnection button and move it outwards until it engaged in a milled groove.
During connection.	Slide the white release button inwards and release. Changing the position of the motor until the gears engage with each other.



5. BURNER SERVICING

5.1 Servicing the combustion assembly

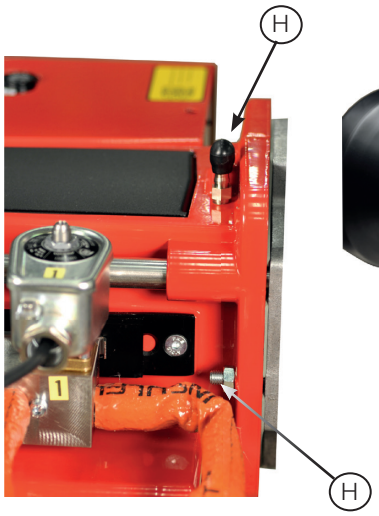
Removal and installation

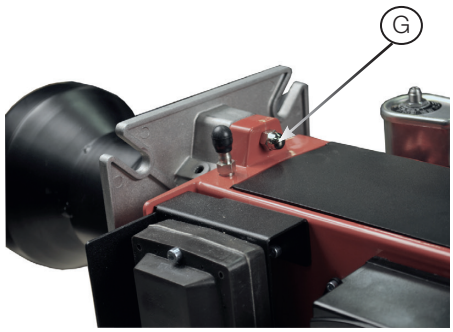
1. Break the main current and disconnect the Euro plugs from the burner.
2. • Loosen the nut (G) and remove the burner from the burner flange, B40 MF.
   • Loosen the nuts (H) and pull the burner backwards, B45-2 MF
3. Remove the brake plate from the oil pipe and clean the brake plate.
4. Unscrew the nozzle/nozzles.
5. Install new nozzle/nozzles. If nozzles have filters, these must be removed before the nozzle can be installed.
6. Install the brake plate (See Brake plate setting). (see technical data)
7. Check the ignition electrodes (See Setting the ignition electrodes). (see technical data)
8. If necessary, replace the ignition electrodes.
9. • Fit the burner and the burner body and lock using the nut (G) B40 MF.
   • Press the burner together and lock using the nuts (H) B45-2 MF.
10. Open the boiler/hinged flange to access the burner tube..
11. Remove and clean the burner tube.
12. Install the burner; make sure you install the drainage hole in the burner tube so that any spilled oil can drain out.
13. Close the boiler/hinged flange.
14. Fit the Euro plugs and turn on the main current.
15. Check combustion *.

! The burner should be serviced at least 4 times a year

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

! Because the burner tube must be installed from the inside the boiler, it must be possible to open the boiler or have a spectacle flange that is designed so that it can be reconnected with the burner tube installed.





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

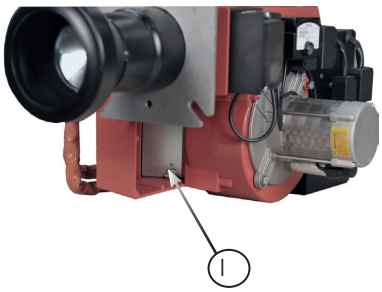
Note:

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

5.2 Servicing air dampers

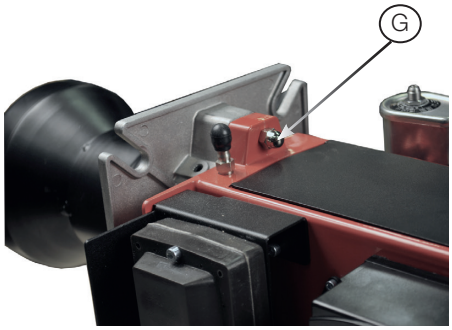
Removal and installation, B40 MF

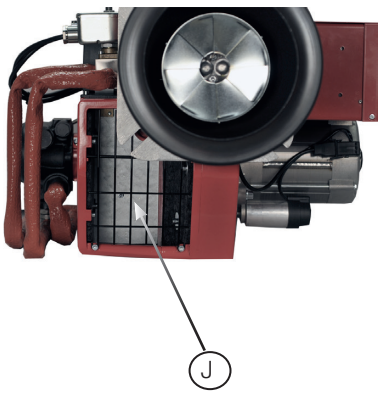
1. Break the main current and disconnect the Euro plugs from the burner.
2. Loosen the nut (G) and remove the burner from the burner flange.
3. Note the position of the air damper and loosen the air damper locking screw.
4. Clean the air damper (I) and the intake. Lubricate any damper shaft.
5. Adjust the air damper and its position.
6. Fit the burner and the burner flange together and secure with the nut (G).
7. Fit the Euro plugs and turn on the main current.
8. Check combustion *.



Removal and installation, B45-2 MF

1. Break the main current and disconnect the Euro plugs from the burner.
2. Loosen the nuts (H) and pull the burner backwards, B45-2 MF
3. Remove the intake grille at the air intake.
4. Disconnect the damper motor.
5. Clean the air damper (J) and the intake. Lubricate any damper shaft.
6. Reconnect the damper motor.
7. Install the intake grille for the air intake.
8. Press the burner together and lock using the nuts (H).
9. Fit the Euro plugs and turn on the main current.
10. Check combustion *.



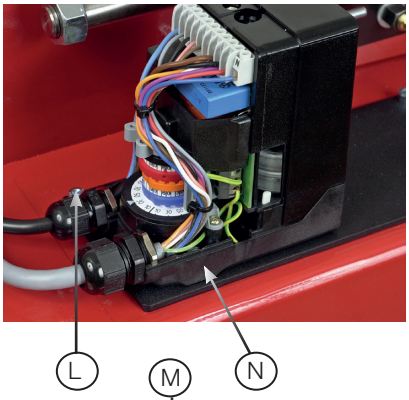


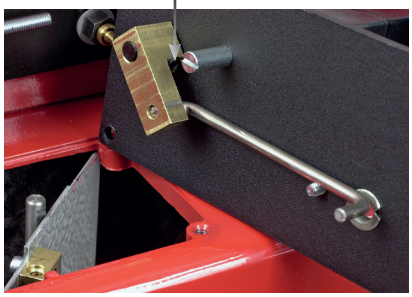
Note:

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

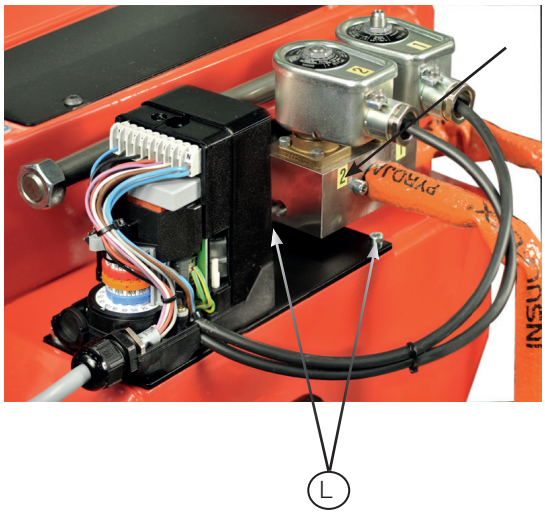
5.3 Replacement of damper motor B45-2 MF

Removal and installation





1. Break the main current and disconnect the Euro plugs from the burner.
2. Note the position of the cables and loosen the wires in the damper motor.
3. Disengage the damper motor and lock it at 30°.
4. Loosen the screws (L) to the damper motor mounting plate. Some of the screws may be difficult to access. The valve block (K) may be loosened in order to make this easier. Observe caution when removing and installing valve block and ensure that a seal has been achieved when reinstalling.
5. Lift the damper motor carefully so that the air damper remains in the air intake. Remove (M) the control arm from the motor shaft.
6. Remove the damper motor from the mounting plate (N).
7. Reinstall the damper motor on the mounting plate.
8. Fit the control arm (m) on the damper motor shaft. It is important that the screw is perpendicular to the plane of the shaft.
9. Disengage the damper motor and lock it at 30°.
10. Install the mounting plate by guiding the control arm into the bracket on the air damper and the air damper shaft in the mounting plate (make sure the bushings between the mounting plate and the damper shaft are in place).
11. Disengage the damper motor, feel that the damper moves easily. Close the damper and reset the protractor on the damper motor.
12. Connect the damper motor electrically.
13. Set the damper motor notches as on the motor that has been replaced.
14. Fit the Euro plugs and turn on the main current.
15. Check combustion. *

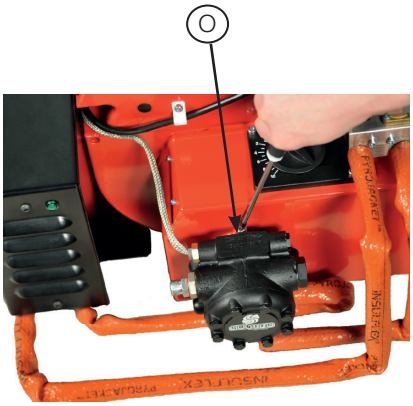


Note:

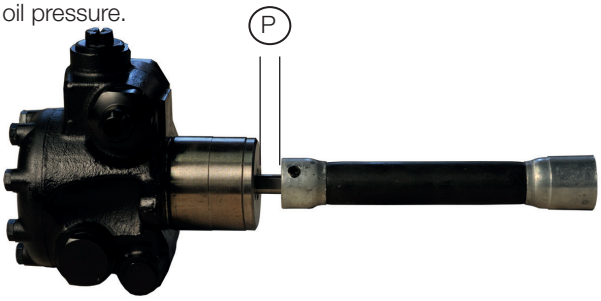
* When servicing/replacing components that affect combustion, an analysis and soot test shall be carried out on the installation.

5.4 Replacement of oil pump B40 MF / B45-2 MF

Removal and installation



1. Break the main current and disconnect the Euro plugs from the burner.
2. Undo the oil hoses from the pump.
3. Remove the immersion heater from the pump.
4. Loosen the screws (O) and pull out the oil pump
5. Move the pump coupling to the new pump and set the same distance between (P) the pump and the pump coupling as before in order to avoid pressure on the pump seal.
6. 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).
7. Fit the immersion heater in the pump.
8. Fit the oil hoses.
9. Fit the Euro plugs and turn on the main current.
10. Bleed the pump, start the burner and set the correct oil pressure.
11. Check combustion. *



! The burner pump has a service life of about 3-5 years if the oil is of a grade that is compliant with standard DIN 51605:2010-10. If oil of different grade is used, and especially if it contains contaminants such as grit, pumice, metal shavings, etc. or is chemically aggressive, the pump may be expected to have a significantly shorter service life.

! 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:

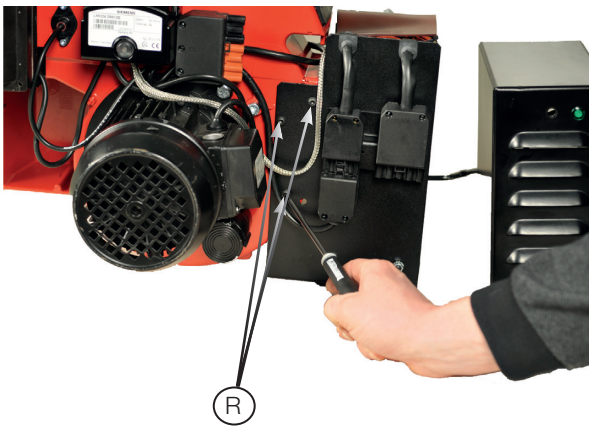
* When servicing/replacing components that affect combustion, an analysis and soot test shall be carried out on the installation.

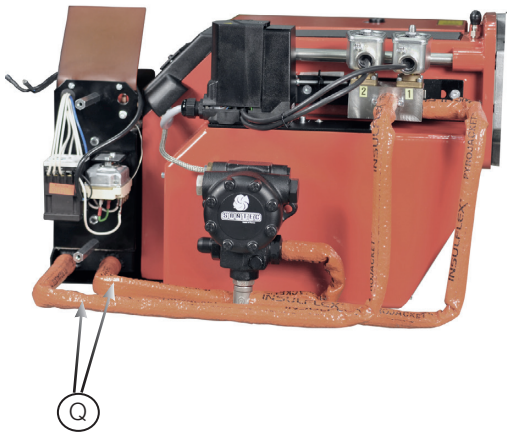
5.5 Replacement of preheaters

1. Break the main current and disconnect the Euro plugs from the burner.
2. If the preheater is hot, let it cool in order to avoid burning yourself.
3. Remove the connection pipes (Q) from the preheater. The pipes should be released first from its second attachment point in order to make removal easier.
4. Note the thermostat setting.
5. Loosen the screws (R) and remove the preheater from the burner.
6. Install the new preheater on the burner.
7. Attach the connection pipes. Be careful when tightening the connection points to avoid subsequent leakage.
8. Adjust the thermostat to the same temperature as the replaced preheater.
9. Fit the Euro plugs and turn on the main current.
10. Commission the motor only to fill the system with oil. Commissioning the motor can be easily done by using the test equipment, internal test.
11. Start the burner. Check combustion. *

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

! When servicing oil bearing components, check the oil density 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.

5.6 Replacement of electrical components

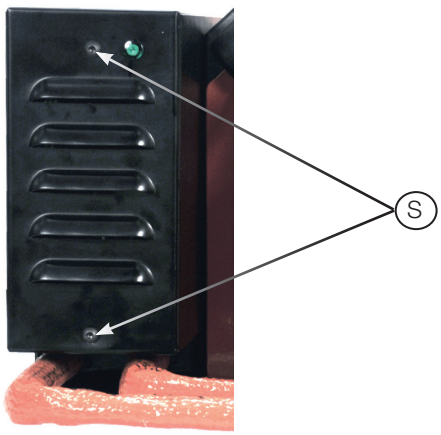
1. Break the main current and disconnect the Euro plugs from the burner.
2. Note the connection of the existing component.
3. Remove the existing component.
4. Install the new component using the same wiring as the existing component or the specified alternative arrangement.
5. Fit the Euro plugs and turn on the main current.
6. Check the function of the new component.
7. Start the burner. Check combustion. *

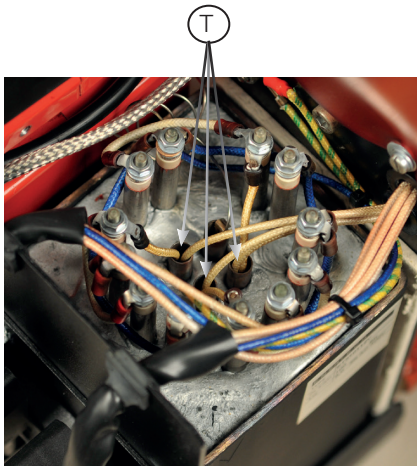
5.7 Replacement of preheater overheating protector

It is usually apparent that the preheater overheating protector needs replacing when the preheater finds it difficult to maintain a sufficiently high temperature, resulting in problems in retaining stable combustion.

1. Break the main current and disconnect the Euro plugs from the burner.
2. Remove the preheater hood, loosen the screws (K)
3. Measure out which overheating protectors (T) need replacing. (A broken overheating protector has broken conductivity.)
4. Note the overheating protector connection points.
5. Remove the overheating protector.
6. Install and connect the new overheating protector. During installation, the overheating protector shall simply be inserted fully into its sensor tube on the preheater.
7. Fit the preheater hood using the screws (S).
8. Fit the Euro plugs and turn on the main current.
9. Start the burner. Check combustion. *

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





Note:

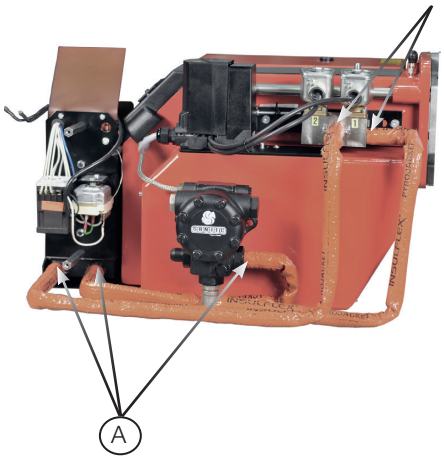
* When servicing/replacing components that affect combustion, an analysis and soot test shall be carried out on the installation.

5.8 Check oil line seals

Where there are temperature fluctuations in the burner oil system due to the preheater being on the burner, this may result, after a period of operation, in oil leaks occurring in the connection pipe's coupling element.

Therefore, check the tightness of the coupling element (A) after a period of operation after installation of the burner and at each service.

If leakage has occurred, it is usually sufficient to tighten the leaking coupling element.

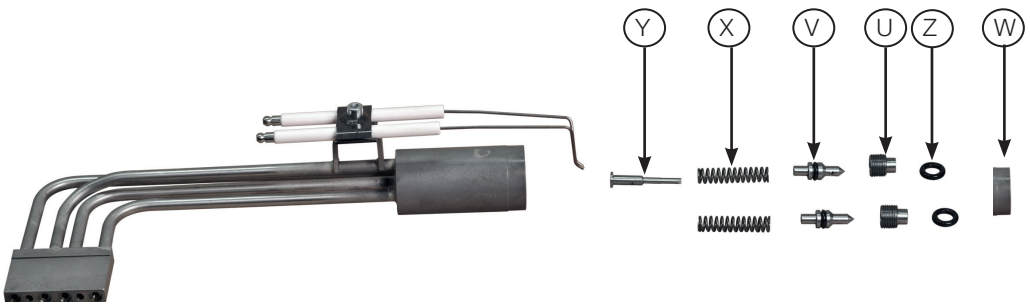


5.9 Check pressure piston nozzle holder seals

As the pressure piston in the nozzle holder (see figure) constitutes a safety component, the seal/function of the pressure piston should be checked on a regular basis.

1. Allow the burner to begin its start-up sequence.
2. Turn off the burner just before it shall release oil through the nozzle.
3. Break the main current and disconnect the Euro plugs from the burner.
4. Open the boiler/burner so that the burner tube/brake plate can be checked.
5. Check whether the burner tube/brake plate is wet with oil.
   a. If no oil can be seen, there is no leak
   b. If there is oil, replace the seat (U) and pressure piston (V) and the o-ring (Z). (see 5.10)
6. Restore the burner to operating condition.
7. Fit the Euro plugs and turn on the main current.
8. Start the burner. Check combustion. *

Pressure piston (V) and O-ring (Z) should be replaced at least every 10 year.



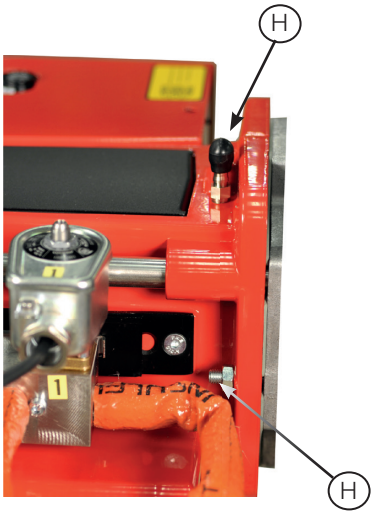
Note:

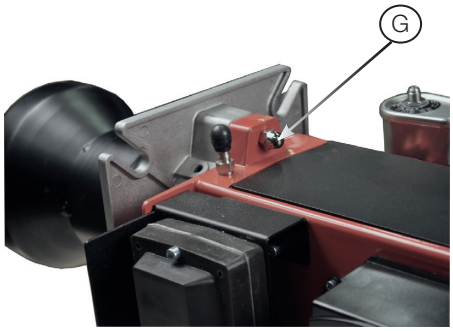
* When servicing/replacing components that affect combustion, an analysis and soot test shall be carried out on the installation.

5.10 Replacement of pressure piston and seat

1. Break the main current and disconnect the Euro plugs from the burner.
2. • Loosen the nut (G) and remove the burner from the burner flange, B40 MF.
   • Loosen the nuts (H) and pull the burner body out of the guides, B45- 2 MF.
3. Remove the brake plate from the oil pipe.
4. Remove the front nozzle holder (see figure)
5. Remove the seat(s) (U) and pressure piston(s) (V) (see figure)
6. Install new pressure piston(s) (see figure). Take care to ensure that springs (X) and needles (Y) are correctly fitted. During fitting, make sure that the o-rings are not damaged.
7. Install the seat(s)
8. Install the front nozzle holder (W); exercise caution when installing so that o-ring(s) (Z) is/are not damaged. Ideally, installation should be done using o-rings inserted in the groove on the front nozzle holder in order to minimise the risk of damage to the o-ring.
9. Install the brake plate (See Setting the brake plate). (see technical data)
10. Check the ignition electrodes (See Setting the ignition electrodes). (see technical data)
11. • Fit the burner and the burner flange together and secure with the nut (G). Fit the Euro plugs and turn on the main current, B40 MF.
    • Press the burner together and lock using the nuts (H). Fit the Euro plugs and turn on the main current, B45-2 MF.
12. Check combustion *.

! During servicing, all affected o-rings must be replaced.





Note:

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

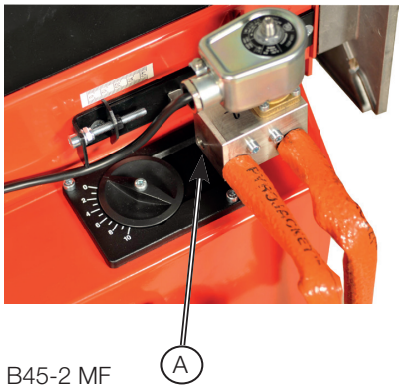
5.11 Immersion heaters for extra preheating

If the burner is used with certain types of oils such as high viscosity, or where the oil at a certain temperature changes state from liquid to solid, problems with the operation of the burner may occur. Operational problems can sometimes be overcome by applying extra preheating to the burner's internal oil system on the valve block and nozzle holder.

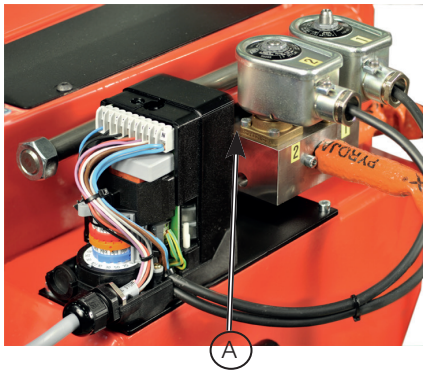
5.11.1 Installation of valve block immersion heater

1. Break the main current and disconnect the Euro plugs from the burner.
2. Install the immersion heater in its intended hole (A) on the valve block.
3. Lock the immersion heater in the hole using the supplied nipple
4. Route the cable in the same track as the immersion heater to the pump
5. Plug the immersion heater electrically, see wiring diagram see B40 MF or B45-2 MF
6. Fit the Euro plugs and turn on the main current.
7. Check combustion *

B40 MF



B45-2 MF

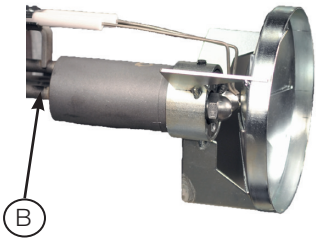


Note:

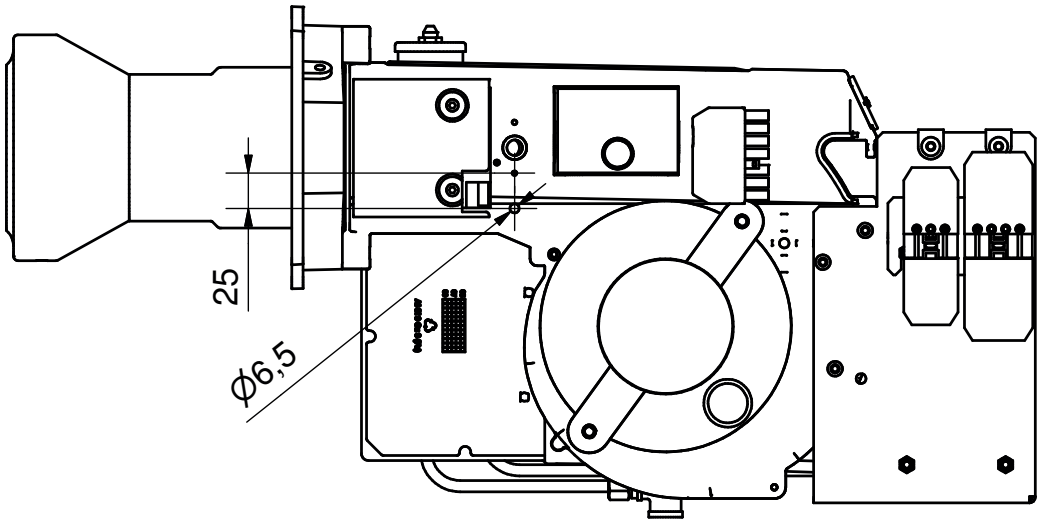
* When servicing/replacing components that affect combustion, an analysis and soot test shall be carried out on the installation.

5.11.2 Installation of immersion heater, nozzle holder

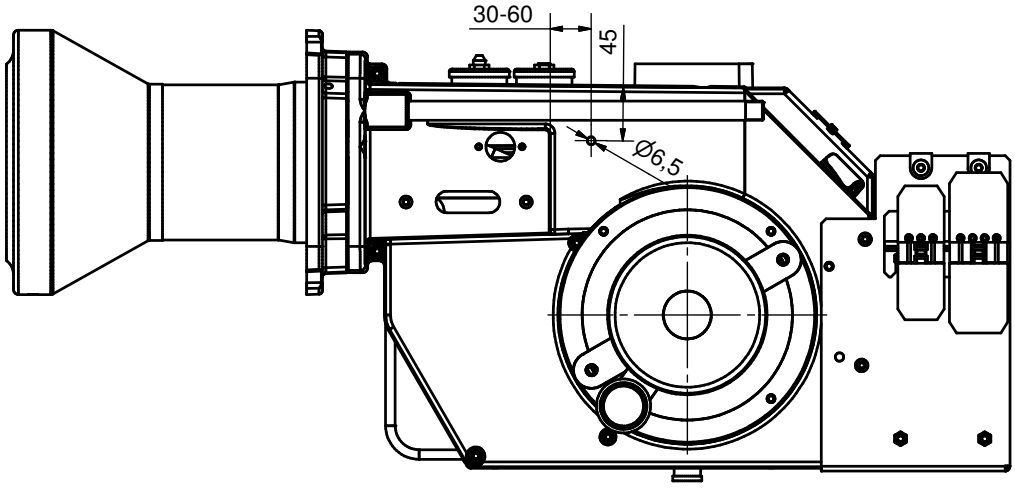
1. Break the main current and disconnect the Euro plugs from the burner.
2. Work the fan housing in accordance with
   - B40 MF, (see figure)
   - B45-2 MF, (see figure)
3. Install the immersion heater in its intended hole (B) on the nozzle holder.
4. Lock the immersion heater in the hole using the supplied nipple
5. Plug the immersion heater electrically, see wiring diagram see B40 MF and B45-2 MF
6. Route the cable through the new hole specifically intended for the purpose and on into the connection point.
7. Fit the Euro plugs and turn on the main current.
8. Check combustion *



B40 MF

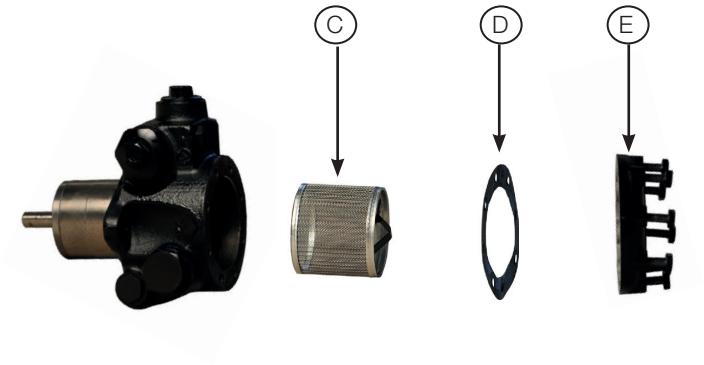


B45-2 MF



5.12 Replacement of pump filter

1. Break the main current and disconnect the Euro plugs from the burner.
2. Close the oil valves
3. Unscrew the cover (E) on the pump.
4. Replace the oil filter (C).
5. Replace head gasket (D).
6. Mount the cover on the pump..
7. Open the oil valves.
8. Fit the Euro plugs and turn on the main current.
9. Check combustion *



5.13 Check/service oil pre-filter

In order to ensure that oil-bearing components enjoy satisfactory operation, avoid breakdowns and have a good service life, pre-filters shall be checked/ serviced at service intervals adapted according to the grade of oil used.

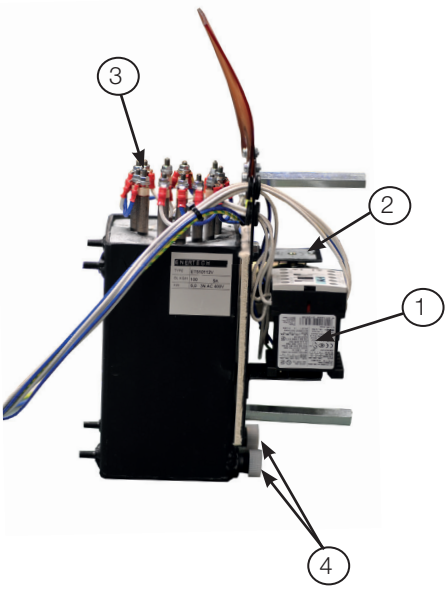
1. Break the main current and disconnect the Euro plugs from the burner.
2. Close the oil valves
3. Remove the filter.
4. Clean/replace the filter.
5. Install the filter.
6. Open the oil valves.
7. Fit the Euro plugs and turn on the main current.
8. Check combustion *

Where a self-cleaning filter is used, there is the option to clean the filter surfaces during operation. Cleaning is done by turning a knob on the filter that scrapes the surface of the filter. Where a self-cleaning filter is installed, the reliability of the burner may be increased without having to perform a complete service of the filter.

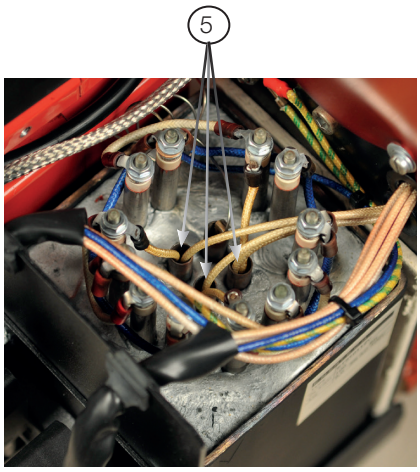
6. Preheater

6.1 Technical data preheater

Connected output	3x2 kW
Voltage	3N ~ 400 V
Current	3x10 A
Resistance	3x22.5 Ω
Oil flow at 80 °C	100 kg/h
Overheating protector	240°C cut-off temperature



1. Contactor
2. Operating thermostat
3. Immersion heaters
4. Connection points oil
5. Overheat protection



The burner is equipped with a preheater to allow the combustion of oil with a higher viscosity.

The preheater is provided with an operating thermostat that has two cut-off temperatures. The lower of the cut-off temperatures is preset to around 30 °C lower than the second cut-off temperature, which is adjustable.

The adjustable cut-off temperature is the desired temperature of the oil in order to ensure good operation of the burner.

The lower cut-off temperature is used as a condition to enable the burner to start its motor and to start pre-ventilation and oil priming. This feature enables the burner to stop during pre-ventilation/flushing without trying to establish a flame. This sequence occurs because the temperature of the preheater has fallen below the cut-off temperature. When this occurs, the burner stops and waits for the temperature in the preheater to be sufficiently high again.

The lower cut-off temperature also has the function that, if the temperature in the preheater drops below the lower cut-off temperature when the burner is in its operational phase, the burner stops. This is a safety feature to prevent poor combustion when the preheater, for any reason, is unable to keep the oil at a sufficiently high temperature. If the burner stops during operation because the temperature in the preheater is too low, preheater function should be checked. Check, for example, safety thermostats, power to the immersion heater(s), function immersion heater(s), etc.

6.2 Adjustment of preheater operating thermostat

The check of which temperature is required to ensure proper ignition and stable operation is done by setting the preheater thermostat to its maximum temperature.

If good start is obtained, the temperature is lowered gradually until an unacceptable start or operation is no longer available. During this procedure, it is of great importance that the boiler itself is not hot. Instead, the setting procedure must be carried out with a boiler that is at a temperature that can be regarded as a cold start temperature.

Once the breakpoint temperature for when good start/operation can no longer be ensured has been found, the preheater's operating thermostat must be set to a temperature with a certain margin against the breakpoint temperature. This is done to avoid the burner having a bad start/operation when environmental factors change over time.

New oil delivery and/or substantial modification of environmental factors may necessitate an adjustment to be made to the preheater thermostat.

6.2.1 Basic settings, preheater

Fuel	Temperature °C
RME	60
Bio oils	130-160
Fossil oils with viscosity 120 mm^2/s	145
Fossil oils with viscosity 90 mm^2/s	115
Fossil oils with viscosity 60 mm^2/s	85
Fossil oils with viscosity 20 mm^2/s	60
Fossil oils with viscosity 6 mm^2/s	0

For oils not specified in the table, the temperature of the preheater should be set so that a viscosity of about 5-10 mm^2/s is after preheating. In some instances, a different temperature than that indicated in the above table may be required due to the characteristics of the oil, e.g. ignition propensity.

! When using a new oil grade, check combustion and adjust the burner settings in order to achieve good combustion.

7. PUMP INSTRUCTION PUMP E4NC-1069 7P

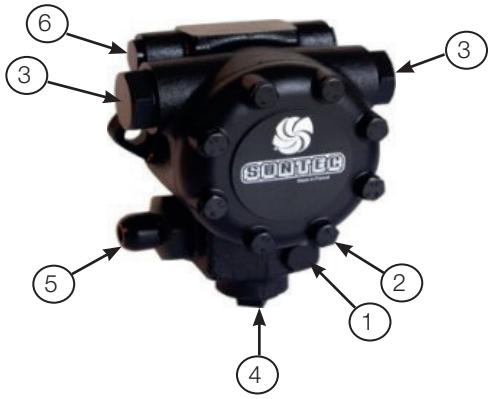
7.1 Technical data

* Viscosity range:	3.0 to 75.0 mm ²/s
Pressure range:	14-30 bar
Oil temperature:	0 to+130°C
Nozzle capacity at viscosity 20 mm²/ s	170-185 l/h
Gear capacity:	190 l / h
Max. pressure on the suction and return side:	3.5 bar

* Oils of higher viscosity may be used if it is pumped to the burner oil pump or if the oil viscosity is lowered to below 75 mm ²/s by it being kept hot.

7.2 Components

1. Manometer connection G 1/8”
2. Connection for nozzle G 1/4”
3. Suction line G 1/2”
4. Return line G 1/2”
5. Pressure regulation with screwdriver
6. Holes Immersion heaters
7. Filter
8. Head gasket
9. Cover



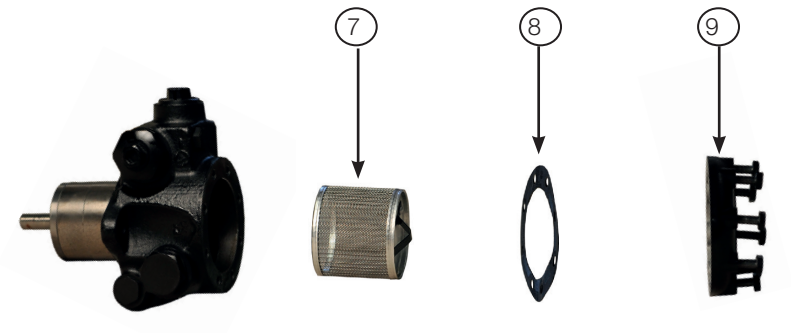
7.3 Oil connection

The pump should be connected using a two-pipe system when it is operated using oils with higher viscosity. A one-pipe system is not recommended.

7.4 Changing the filter

Change the oil pump oil filter in accordance with the following.

- Close the oil valves
- Unscrew the cover on the pump.
- Replace the oil filter.
- Replace head gasket.
- Mount the cover on the pump.
- Open the oil valves.

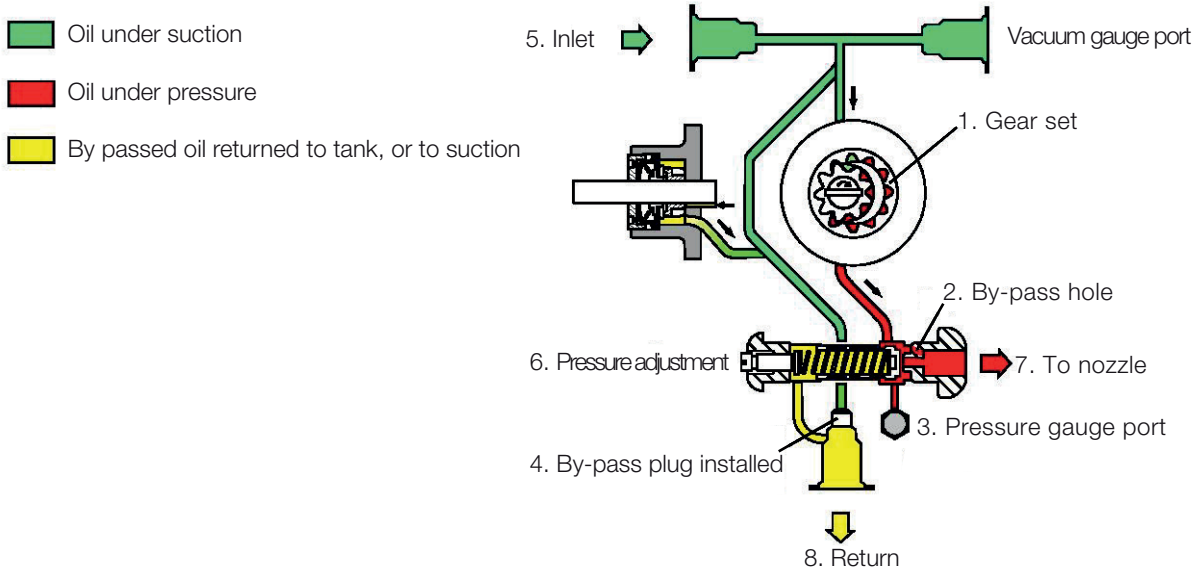


7.5 Function

The pump gear (1) draws oil through the pump suction port (5) from the tank through the filter in the pump and transports the oil to the valve (6) which controls the oil pressure to the nozzle. Oil that does not go through the outlet (7) to the nozzle will be bypassed (2) through the valve (6) back to the return port (8) on the pump.

7.6 Preheating pump

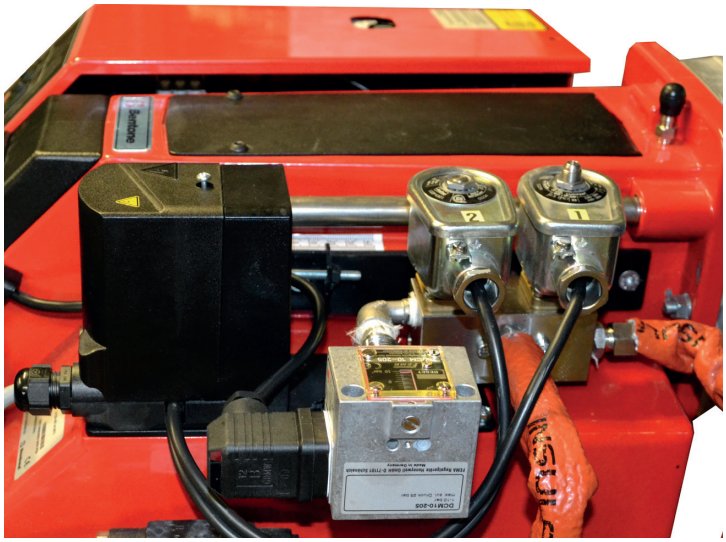
The pump has the facility to fit an immersion heater to providing preheating. The pump should be equipped with an immersion heater in order to facilitate cold starting and operation where oils of a higher viscosity are used. The burner is of a standard design and equipped with an immersion heater to preheat the pump.

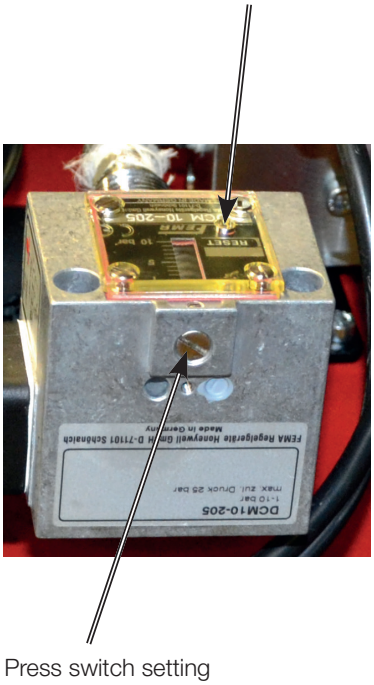


7.7 Return Oil Pressure Switch

The pressure switch ensures that pressure at the return oil side of the burner does not become high enough to cause the oil valves in the nozzle holder to open and discharge oil during aeration and flushing. These valves are held closed by springs and open at a pressure of approx. 10 bar. When the pressure exceeds 3 bar, the switch will trigger and shut down the burner in order to prevent the oil from passing through the valves. The burner enters blocking mode when the pressure switch is connected to the operating circuit in the burner's electrical system. The pressure switch must be reset manually by pressing in the red button on the switch next to the pressure scale.

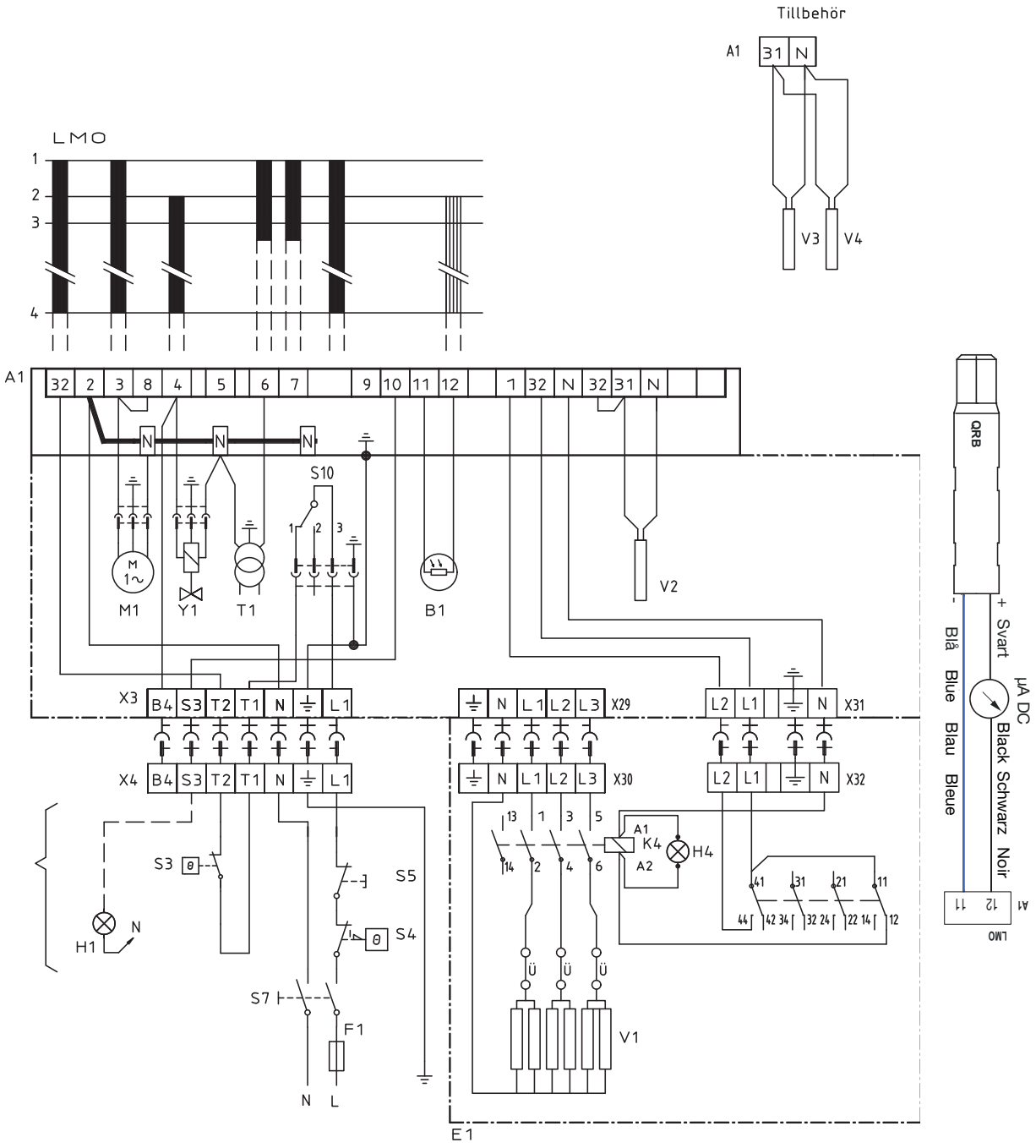
The pressure switch may be set to max. 3.5 bar, which is the highest pressure for which the oil pump is designed at the return side. Setting a higher pressure will damage the gaskets in the pump.



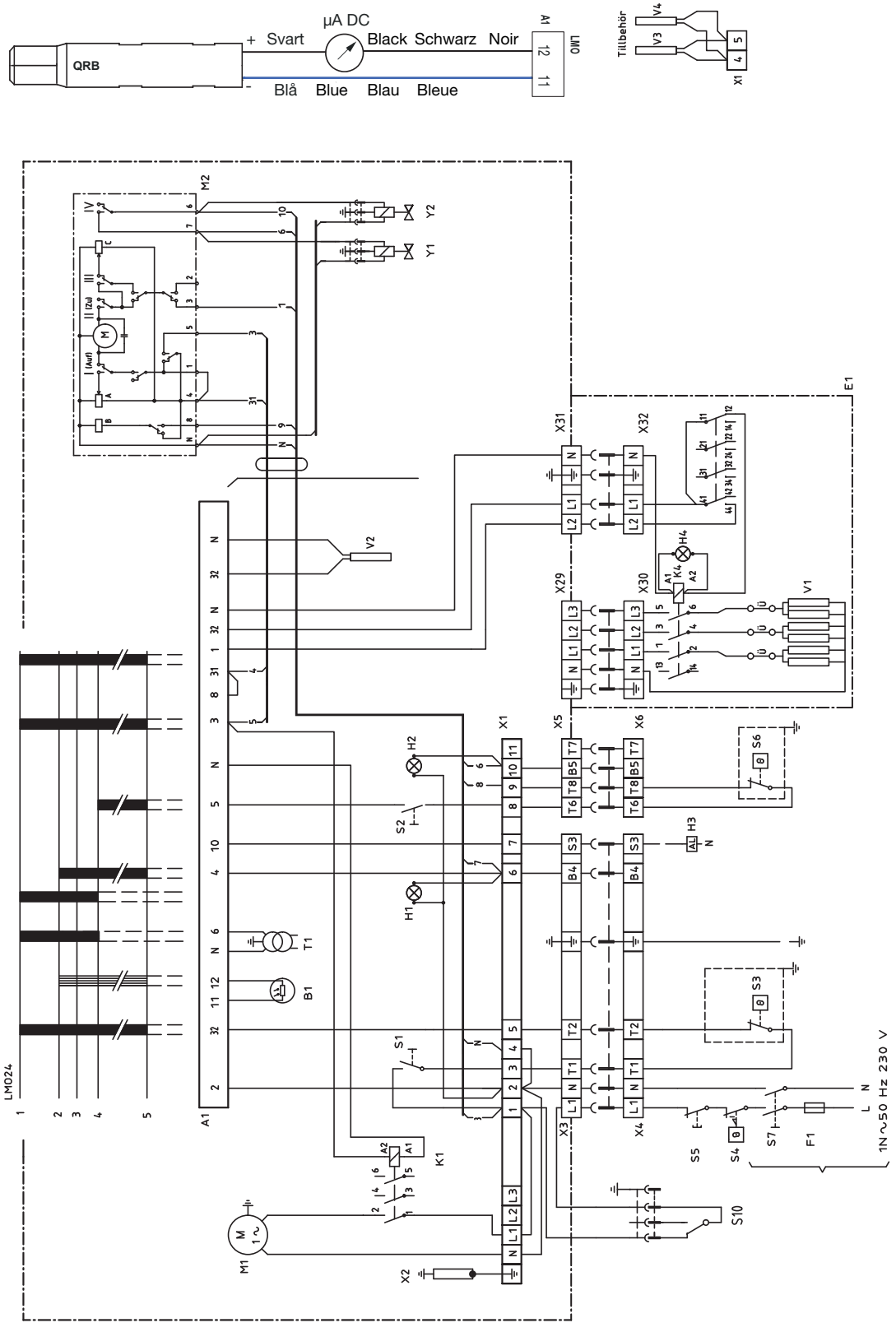


8. ELECTRICAL EQUIPMENT

8.1 B40 MF wiring diagram LMO24.255 ...



8.2 B45-2 MF wiring diagram LMO24.255...



8.3 Component list LMO24.255 ...

A1 Burner control
B1 Photoresistor
E1 Preheater
F1 Operating fuse
H1 Lamp, low capacity
H2 Lamp, high capacity
H3 Alarm signal 230 V
H4 indication preheater
K1 Motor contactor with thermal overload protector
K4 Directional relay
M1 Burner motor
M2 Damper Motor
P1 Time meter, total operating time
P2 Time meter, high capacity, total operating time
S1 Operating switch
S2 Operating switch, stage 2
S3 Control thermostat
S4 Temperature limiter
S5 Micro switch for hinged door
S6 Control thermostat, stage 2
S7 Main switch
S10 Oil pressure switch, max/lockout funktion
T1 Ignition transformer
Y1 Solenoid valve 1
Y2 Solenoid valve 2
X1 Connection terminal board
X3 Plug-in contact, burner
X4 Plug-in contact, boiler
X5 Plug-in contact, stage 2, burner
X6 Plug-in contact, stage 2, boiler
X29 3-phase supply heater, burner
X30 3-phase supply preheater, boiler
X31 Preheater control, burner
X32 Preheater control, boiler
V1 Element 1
V2 Element 2
V3 Element 3
V4 Element 4

Max loading K1
Connection A1,A2 / 95, 96 / 97, 98 Max 0,2A/15W

8.4 Function LMO24.255 ...

1 **Operations switch ON, twin thermostat ON**
Burner motor starts, ignition spark is formed and preventilation continues until the preventilation time is over and solenoid valve 1 operates (2).

2 **Solenoid valve 1 operates**
Oil mist is formed and ignited. Photoresistance indicates flame.

3 **Safety time ends**

a If the flame goes out before this time limit is passed, the machine switches to blocking mode.

b If the flame, for whatever reason, disappears after this time limit has passed, the burner will make a new attempt.

4 **High load thermostat ON (B45-2 MF)**
The burner is in operating mode and can switch between high and low load

4-5 **Operational status**
If burner operation is interrupted by the main switch or thermostat, a new start will take place once conditions as specified in paragraph 1 are met.

The machine blocks

Red light in the machine is on. The burner is restarted by pressing the reset button.

8.5 Technical data LMO24.255...

	LMO24
Pre-ignition time:	25 sec
Pre-ventilation time	25 sec
Reconnection after tripping	<1 sec
Ambient temperature	from - 20 to + 60 °C
Min. current at flame:	45 µ A
Max. output at dark, start:	5.5 µ A
Enclosure type	IP 40
Safety time	5 sec

Check of photo current

Photo current is measured using a DC ampmeter (torsion coil instrument) connected in series with the photocell.

8.6 Colour codes

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

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

8.7 Fault codes

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

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

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

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

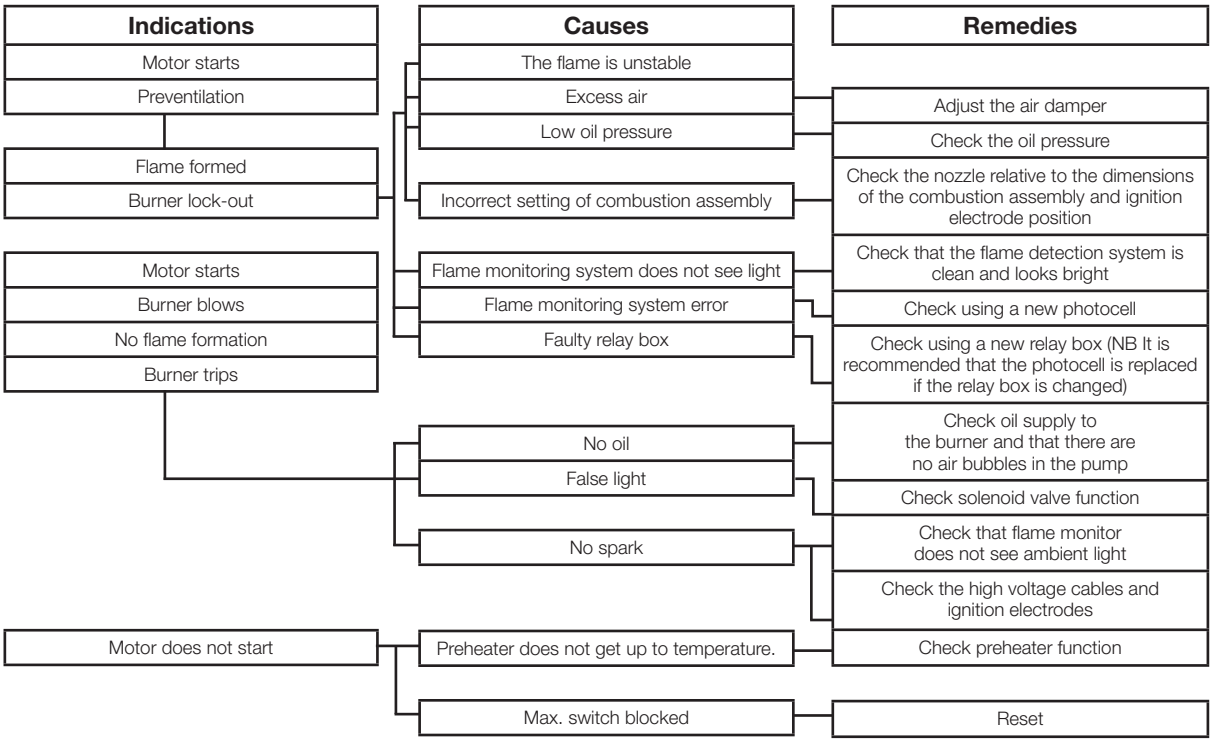
To return to normal operation: Press the reset button for 1 second.

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

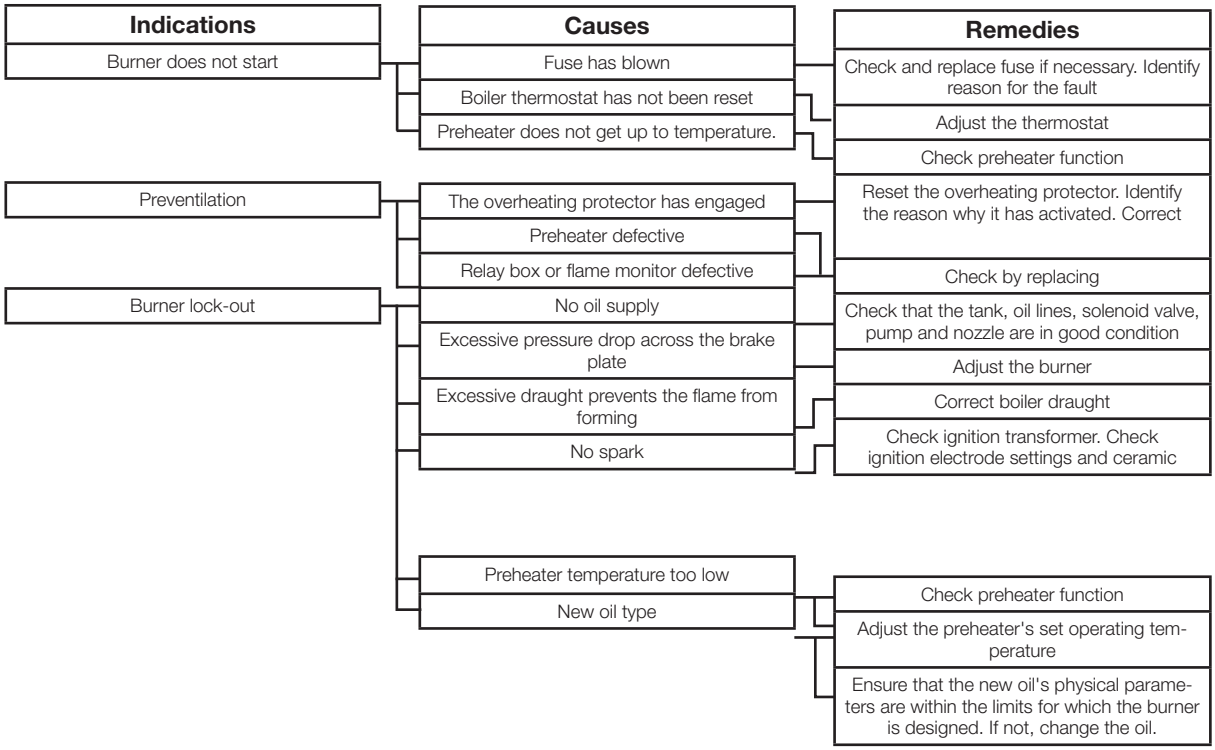
To return to normal operation: Press the reset button for 1 second

9. FAULT LOCATION

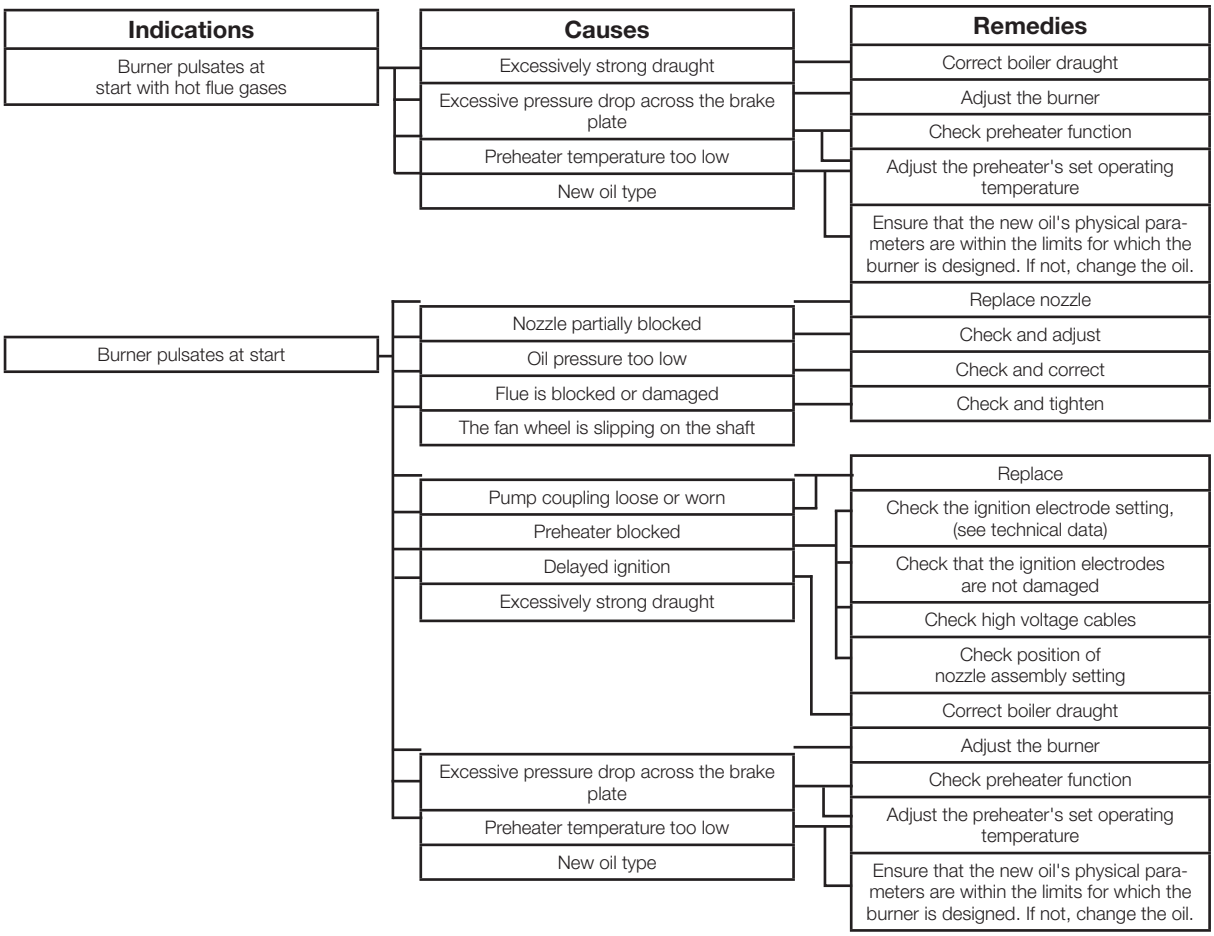
9.1 Burner will not start



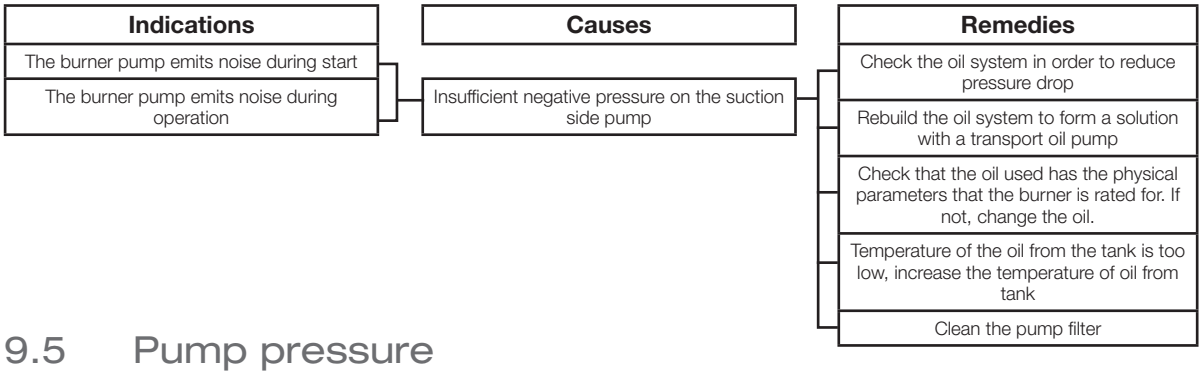
9.2 The burner does not start after normal operation



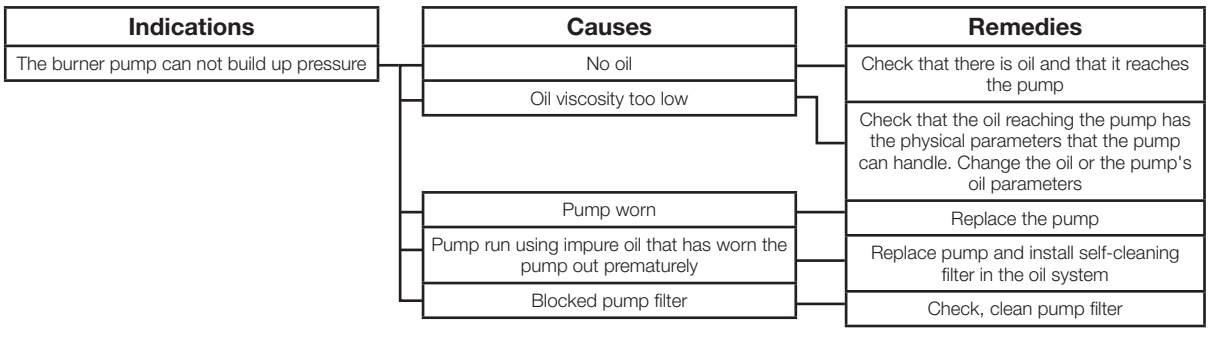
9.3 Delayed ignition



9.4 Noise in pump



9.5 Pump pressure



EU Declaration of conformity

CE

Bentone Oilburners

Type

BF 1	ST 133	B 10	B 55
ST 97	ST 146	B 30	B 65
ST 108	B 1	B 40	B 70
ST 120	B 2	B 45	B 80

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+A 1 :2011	(excluded Annex J/K) Automatic forced draught burners for liquid fuels

Additional information can be downloaded at:

www.bentone.com

Enertech AB
Box 309
S-341 26 LJUNGBY

Ljungby September 26rd, 2017

Håkan Lennartsson

Managing Director

Enertech AB

Bentone®

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 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.

Installed by:

……..

Tel:……..

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

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