

Technical Information • Installation Instructions

M3-LAL

Issued July 2024
Right reserved to effect technical changes
in the interest of product improvement !

Oil



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1. General information

The installation of an oil-fired system must conform to extensive regulations and requirements. It is therefore the duty of the installer to be familiar with all applicable regulations and requirements. Installation, start-up and maintenance must be performed with utmost care. Fuel oil type EL to DIN 51603 must be used.

The burner must not be operated in rooms with high levels of air humidity (laundry rooms), dust or corrosive vapours.

Manually operated shut-off valve

A manually operated shut-off valve shall be provided upstream of all isolate the burner. The manual fuel valve shall be readily accessible.

Filter and venting device

A filter shall be fitted upstream the burner to prevent the ingress of foreign elements. Adequate means to vent the fuel supply be provided.

2. Standard Specifications

Before installing the Series M3 oil burner, please check that all items included in the standard specifications are present.

Items included in supply:

burner, fixing unit, separate operating instructions, technical information leaflet, flange gasket, one 7-pin and one 4-pin connector (Wieland connector).



**Oil nozzles are not included
in the items supplied.**

3. Maintenance and customer service

The complete system should be checked once a year for correct functioning and leaks in accordance with DIN 4755 by a representative of the manufacturer or other suitably qualified person.

According to DIN EN 267, the repair of components with safety-related functions is not permitted. On the other hand, parts may be replaced with genuine, equivalent – and where necessary tested – components.

We accept no liability for consequential damage in cases of incorrect installation or repair, the fitting of non-genuine parts or where the equipment has been used for purposes for which it was not intended.

4. Operating instructions

The operating instructions together with this technical information leaflet must be displayed in a clearly visible position in the boiler room. It is essential that you enter the address of the nearest after-sales service centre on the back page of the operating instructions.

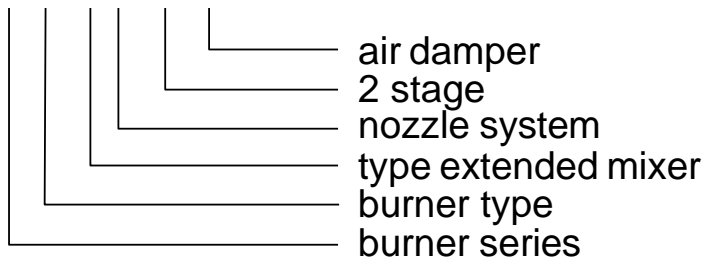
5. Instruction of operating personnel

Faults are often caused by operator errors. The operating personnel must be properly instructed in how the burner works. In the event of recurring faults, Customer Service should be notified.

6. Key for code designation

Example:

M3.12-Z-L

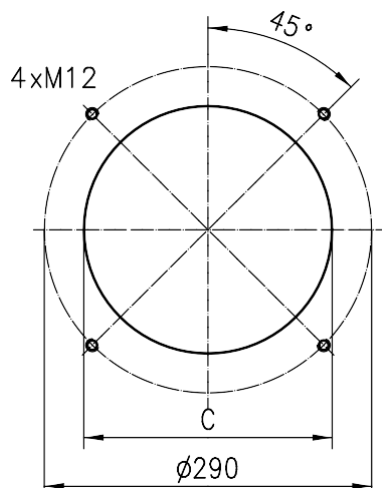


7. Technical data

Technical data	Burner type	
	M3.12	M3.32
Burner output in kW	534 - 1494	1213 - 2503
Oil throughput kg/h	45 - 126	102 - 211
Fuel oil	Type EL, to DIN 51603	
Method of operation	2-level, 2 nozzles	
Voltage	230 / 400 V - 50 Hz	
max. current consumption	7.5 A	11.5 A
Electric motor power (at 2800rpm) in kW	3	4.4
Oil pump	AJ4	J7
Flame failure controller	QRB3	
Control box	LAL1.25	
Weight in kg	107	115
Noise emission in dB (A)	≤ 86	≤ 90

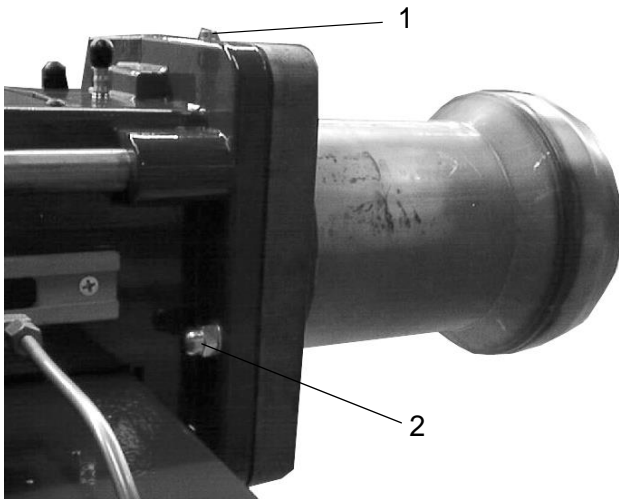
8. Boiler connection measures

Dimensions in mm



	C [mm]
M 3.12	185
M 3.32	205

9. Installation of flange



The boiler connection plate must be prepared for the connection dimensions specified in "Boiler Connection Dimensions". The flange gasket can be used as a marking template.

First of all, loosen the size 17 nuts (2) and the cap nuts on the guide rods. The burner flange complete with burner pipe can now be pulled forwards over the guide rods.

If the door opening on the boiler is smaller than the diameter of the burner blast tube, the burner blast tube can be removed by rotating the bayonet fixing after releasing the securing screw (1).

The threads of the fixing screws should be brushed with graphite before fitting. Align flange and burner blast tube assembly and tighten screws.

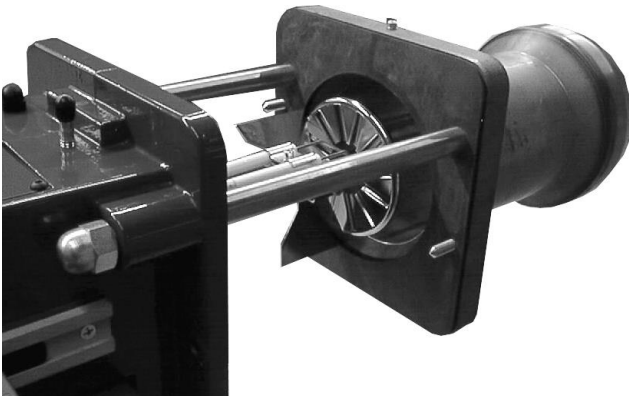


Important:

Boiler designs with a very low front plate or door, or boilers with inverted-flame burners require a suitably extended mixer. If the oil burner was ordered with an extended mixer, this will already be fitted.

Otherwise the short burner blast tube and nozzle assembly must be replaced with longer versions. The standard extension is 200 mm.

10. Service position



The burner can now be fastened to the flange. To do so push the gasket and burner over the guide rods and secure by means of cap nuts at the end of the guide rods.

The burner is now in the service position.

11. Nozzle selection

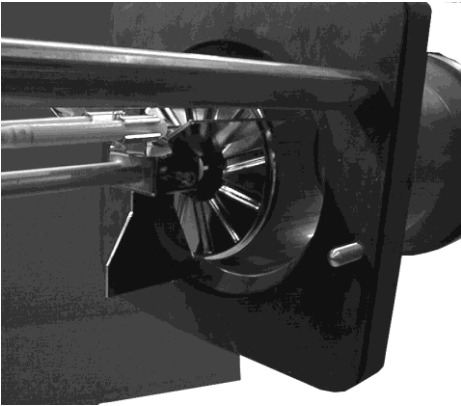
In the case of two nozzle burners the entire output is distributed via two nozzles. As a rule nozzle 1 assumes the basic load (starting output).

At peak demand nozzle 2 is switched on with the remainder of the oil volume. A different load division may be required depending on the heat requirement and design of the warm air heater.

Max. control ratio 1 : 2.5

For selection of the correct nozzle size relative to the relevant burner type and boiler output we refer you to the nozzle selection tables on page 14.

12. Inserting the nozzles

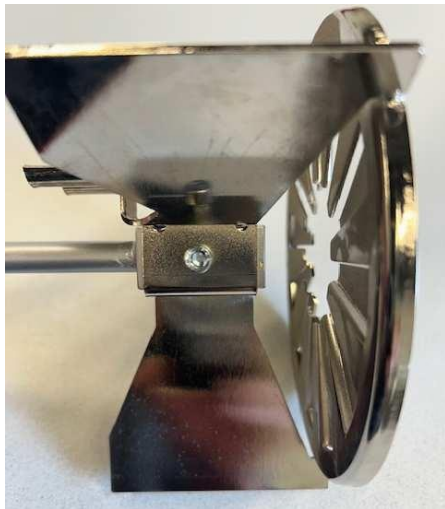


After removing the two M10 nuts (spanner size 17) the burner can be drawn back on the guide rods. It is now in the servicing position. Undo the screw and withdraw the flame ring forwards.

Unscrew the plastic dust screw from the nozzle holder. When doing so, it is essential to ensure that the sealing face is not damaged.



Screw in the selected nozzles using a wrench (size 16). Brace with an open-ended spanner. The flame ring is then refitted and secured with the screw.

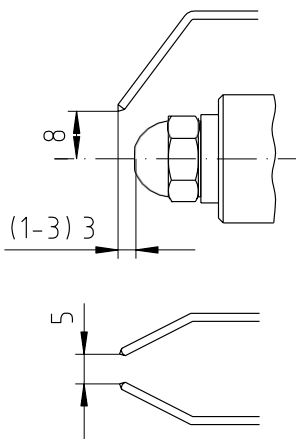


Position the baffle disc in the centre of the nozzle holder and tighten.



On burner type M 3 the nozzle for start output (1st level) resides under the ignition electrodes.

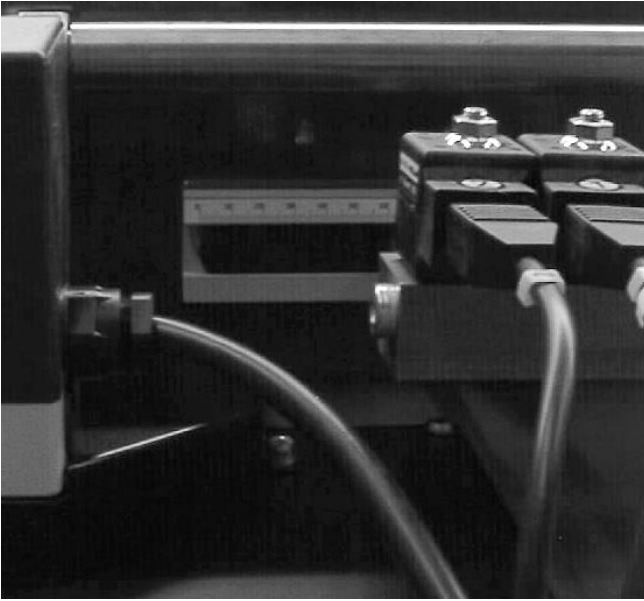
13. Ignition electrode



The following spacing dimensions should be maintained between the nozzle and ignition electrode:

The specified dimensions are for the purpose of control in the event of any correction being necessary or after an electrode change.

14. Adjustment of the nozzle assembly (dimension "A")



The dimension "A" indicates the position of the nozzle assembly and flame ring in the burner blast tube taper. With the aid of the presetting table the burner can be set to the relevant output.

In the case of boilers with a higher/lower furnace pressure, dimension "A" has to be slightly increased/decreased.

The position of the cam on the air valve positioning motor also has to be adjusted.

Higher resistance † higher setting

Lower resistance † lower setting



Precise adjustment to suit the specific system concerned is essential!

15. Oil connection

The oil line must end close enough to the burner to ensure that the flexible oil hose is not under tension when connected. Care should be taken to ensure that the burner can easily be moved into the servicing position.



It is essential that an oil filter is fitted upstream of the oil pump.

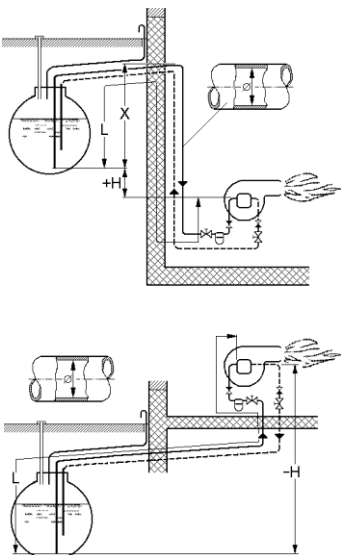
The tables for dual/single-pipe installation show the maximum possible piping lengths dependent upon 3 factors assuming use of fuel oil type EL 4.8 cST.

- Height difference between pump and tank
- Nozzle flow rate or pump type
- Pipe diameter

The calculated resistance for the supply lines include allowance for 4 elbows, 1 valve and 1 check valve for the resistance.

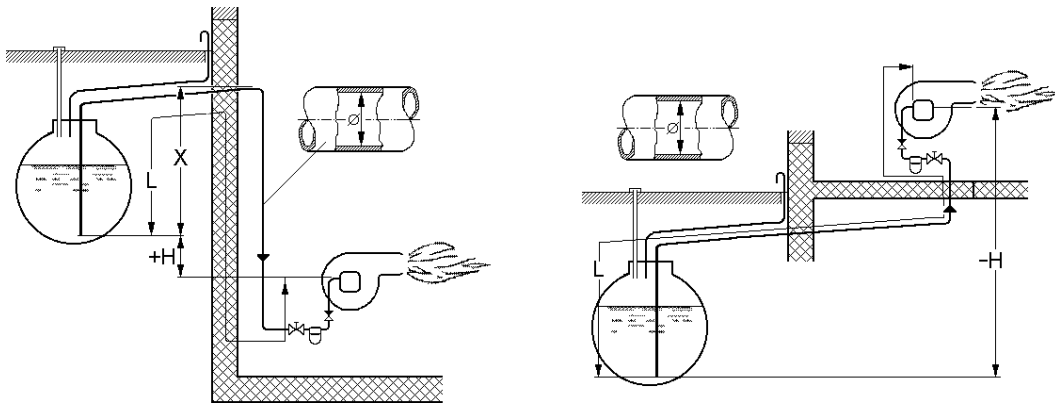
The measure "X" should not exceed a length of 4 m, because of eventual degasifications of the oil.

Two-line system



H (m) ∅ mm	Suntec AJ4 L (m)				Suntec J7 L (m)				
	10	12	14	16	10	12	14	16	20
4.0	23	49	51	100	7	17	34	60	-
3.0	20	43	80	100	6	15	29	52	-
2.0	17	37	69	100	5	12	25	45	-
1.0	14	31	58	100	3	10	21	37	-
0.5	13	28	53	91	3	9	19	34	-
0	13	25	47	81	2	8	16	30	77
-0.5	10	22	42	72	-	6	14	26	67
-1.0	9	19	36	62	-	5	12	22	58
-2.0	6	13	25	43	-	3	8	15	40
-3.0	3	7	14	24	-	-	3	7	22
-4.0	-	-	-	5	-	-	-	-	4

Single-line system



Nozzle ∅ mm	14 (gph)			20 (gph)				30 (gph)				45 (gph)			
	8	10	12	8	10	12	14	10	12	14	16	10	12	14	16
H (m)	L (m)	L (m)	L (m)	L (m)	L (m)	L (m)	L (m)	L (m)	L (m)	L (m)	L (m)	L (m)	L (m)	L (m)	L (m)
4.0	21	52	100	14	36	75	100	23	49	92	-	15	32	61	100
3.0	18	45	95	12	31	66	100	20	43	81	-	13	28	53	92
2.0	16	39	82	11	27	57	100	17	37	70	-	11	24	46	79
1.0	13	33	69	9	23	48	89	15	31	59	-	9	20	38	66
0.5	12	30	62	8	20	43	81	13	28	53	-	8	18	35	60
0	11	27	56	7	18	39	72	12	25	48	82	7	16	31	54
-0.5	9	23	49	6	16	34	64	10	22	42	72	-	14	27	47
-1.0	8	20	43	5	14	30	55	9	19	36	63	-	12	23	41
-2.0	5	14	30	3	10	21	39	6	13	25	44	-	8	16	28
-3.0	3	8	17	-	5	11	22	3	7	14	25	-	4	8	15
-4.0	-	-	4	-	-	-	5	-	-	-	5	-	-	-	-

16. Oil pump

The pumps are intended for installation in a dual-pipe system (factory setting).

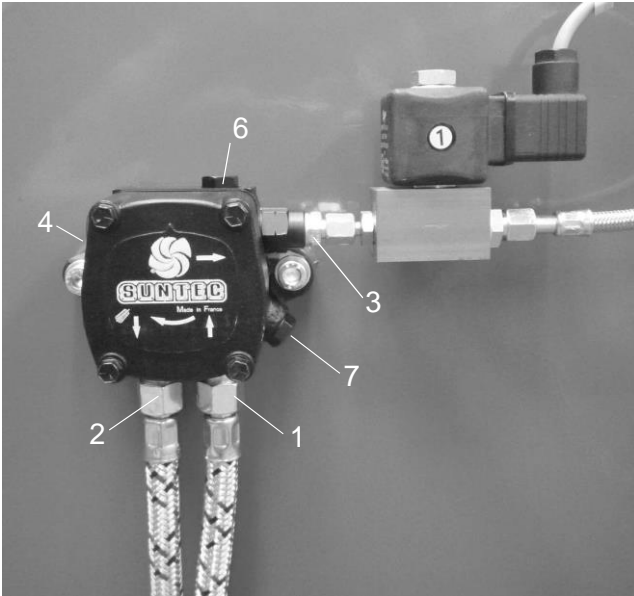
The pump pressure must be set for the output required (see Adjustment Table).

The specified pump pressures are only guide values and may deviate depending on plant conditions.

For this:

- Unscrew pressure testing connection 6.
- Screw in pressure gauge

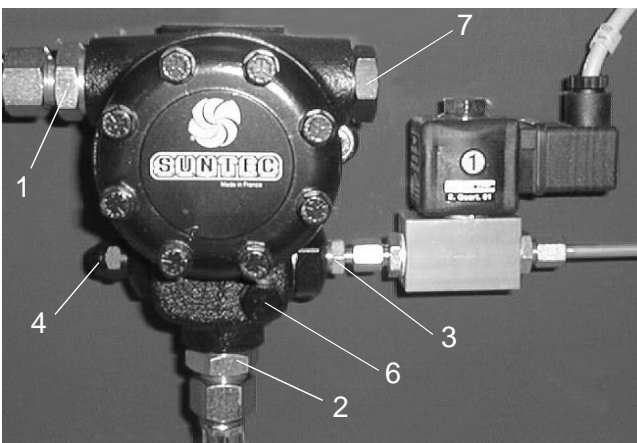
Set the pump pressure by adjusting the pressure in accordance with the tables.



Suntec AJ4

Remove the return pipe and connection fitting. Unscrew the bypass plug from the return pipe connection and seal off with a plug. The intake volume of the pump is then the same as the nozzle flow rate.

- 1 = feed line
- 2 = return line
- 3 = nozzle output
- 4 = pressure adjuster
- 6 = pressure meter connection
- 7 = vacuum meter connection



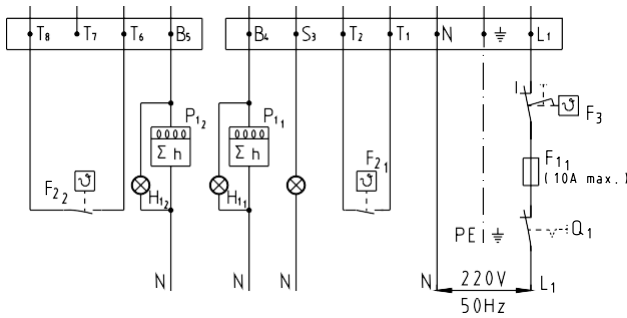
Suntec J7

Remove the return pipe and connection fitting. Unscrew the bypass plug from the return pipe connection and seal off with a plug. The intake volume of the pump is then the same as the nozzle flow rate.

- 1 = feed line
- 2 = return line
- 3 = nozzle output
- 4 = pressure adjuster
- 6 = pressure meter connection
- 7 = vacuum meter connection

For conversion to a single-line system we recommend the use of a heating oil filter with return line feed. In this way the pump is left in two-line mode. Fit the feed and return line burner hoses to the filter. Open the oil cock on the filter. Put the plant into operation.

17. Electrical connection



For an explanation of the switching symbols, see separate circuit diagram

The electrical connection of the burner must be made in the enclosed connector section according to the wiring diagram, taking into account the local regulations.

The supply line must be protected with a 10 A fast-blow or 6.3 A slow-blow fuse and laid as a flexible cable.

The burner motor must be connected separately.



If the connector part is already wired:
Check the connections according to the adjacent wiring diagram.



For connection work and removal of electrical parts, set the main switch to 'Off' and remove the mains fuse.

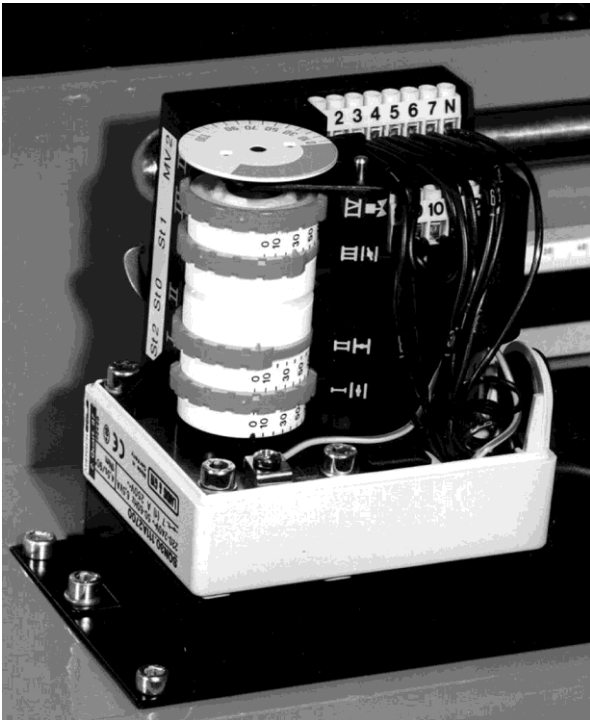
The electrical connection of the burner must be carried out in accordance with the wiring diagram. This may only be carried out by authorised specialists. The supply line to the burner must be laid with flexible cable.



See separate wiring diagram

To access the control unit, the cover must be removed cover must be removed and placed in the service position. To do this, unscrew the 2 fastening screws (1) and fold the cover to the left.

18. Air flap positioning motor



The air valve positioning motor adjusts the air valve position or trips the solenoid valve on two-level burners with air shut-off. Adjustment is via limit switch cams on the positioning drive roller.

You can refer to the presetting table for the cam positions for adaptation of the burner to the requisite boiler output.

To do so:

Remove cover from air valve positioning motor. Change cam positions with aid of adjusting key. The adjusting key is located on the side of the air flap positioning motor.

If necessary, switching cams can be adjusted when setting the burner.

Higher setting = More air, pressure increases
Lower setting = Less air, pressure decreases

Please note the following when adjusting the switch cams:

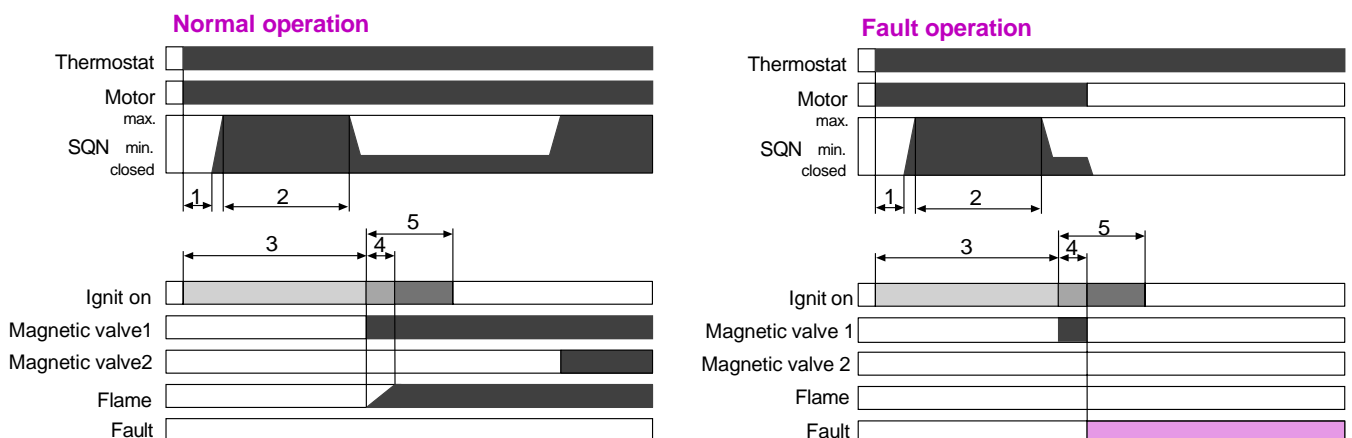
- Do not set cam position for ST1 higher than ST2.
- Set cam position MV2 roughly 10°-20° above cam position ST1.
- Check cam position for MV2 after correcting cam position for ST1.
- After adjusting ST1 and ST2 you have to switch to the next level in order to activate the new setting.
- When adjustment of the burner is complete, refit positioning motor cover and set switch on cover to position for level 2.

19. Automatic oil firing control device

The automatic oil firing control devices are designed for the control and monitoring of the burners. The function of the automatic control device is effected via a control program.

- Automatic oil firing device Landis&Gyr LAL 1.25 for all burner types M 3.

20. Functional diagram



21. Flame failure controller

The flame sensors indicate to the control device the presence of a flame.

The flame failure controller QRB 3 complete with protection pipe must be inserted into the fastening flange provided for this purpose – Take heed of the guide groove ! In addition the correct position is defined by a metal clip.

22. Operability check

A safety check of the flame failure system must be carried out when the appliance is first commissioned and after any inspections or long periods of inactivity.

Start-up test with flame detector covered:

After expiry of the safety period, the burner should perform a safety cut-out.

Start-up test with flame detector illuminated:

After approx. 20 s of pre-aeration the burner must go over to fault.

Standard. Startup; if burner in operation, darken the flame sensor:

Attempt startup again, at the end of the safety time the burner must go over to fault.

23. Start-up

- Screw in oil pressure gauge for measuring pump pressure.
- Preset the burner in accordance with the nozzle selection table on page 14 to the appropriate boiler output.
 - Nozzle size
 - Dimension "A"
 - Air valve position for level 1/level 2
- Connect burner to boiler interface.
- Switch on burner.
- Burner starts up with open air flap (pre-aeration Position 2nd level) .
- Upon completion of pre-aeration the air flap runs to 1st level position and opens solenoid valve 1.
- The burner ignites in level 1.
- Set the burner by means of the switch on the hood to the 2nd level and check the pump pressure. Then set it again, if necessary.
- Carry out check of CO₂ content, flue gas temperature and sooting characteristics.
- Correct the blower air via the air valve positioning motor, see page 11
- After regulation of level 2, set the switch to level 1.
- Carry out check of CO₂ content, flue gas temperature and sooting characteristics.
- Correct the blower air via the air valve positioning motor, see page 11
- When burner adjustments are complete, re-fix cover on air valve positioning motor.
- Switch off burner and remove oil pressure gauge.

24. Faults

Burner faults are signalled by the fault lamp lighting up. If a fault cut-off occurs during burner operation, check the following first of all:

- Is fuel present
- Are the control and safety devices such as temperature controller safety thermostat water deficiency safety device and limit switch correctly set and operable ?

Should the fault cut-off still be pending, the functions on the burner must be precisely checked.

	LAL 1.25
Sensor current	approx. 100 mA
Preflushing time	22.5 s
Pre-ignition phase	from start
Post-ignition time	15
Safety time	5 s

Apart from the possible defects already mentioned, burner faults can also have the following causes:

- Ignition spark not in the right place.
- Oil cock closed.
- Oil pump defective or oil filter blocked.

25. Control device Landis&Gyr LAL 1.25

In the event of faults the programming mechanism always stops. The symbol above the indicator's read-off mark identifies the type of fault:

- ◀ **No start**, e.g., because the CLOSED signal from the end changeover switch «Z» (or auxiliary switch «M») is missing at terminal 8 or because contact has not been made at terminals 4 and 5.
 - ▲ **Aborted startup** because the Open signal from the end changeover switch «A» is missing at terminal 8. Terminals 6, 7 and 15 remain live until the fault is rectified !
 - **Fault cutoff** on account of a defect in the flame failure control circuit.
 - ▼ **Aborted startup** because the position signal of the auxiliary switch «M» is missing at terminal 8 for the small flame position. Terminals 6, 7 and 15 remain live until the fault is rectified !
- 1 **Fault cut-off** because no flame signal has registered when the safety time expired.
- | **Fault cut-off** because the flame signal has failed during burner operation.
- ◀ **Fault cut-off** upon or after expiry of the control program on account of extraneous light (e.g., non-extinguished flame, leaking fuel valves or shut-off elements on the nozzle rod, defect in the flame monitoring circuit or suchlike).

Unlocking of the automatic control device following a fault cut-off can be effected immediately. After unlocking, the programming mechanism always runs first of all to its starting position, only terminals 7, 9, 10 and 11 thereby receiving a voltage in compliance with the control program.

Not until after this does the automatic control device effect the programming for putting the burner back into operation.



Important:
Confirm unlocking for a max. of 20 s !

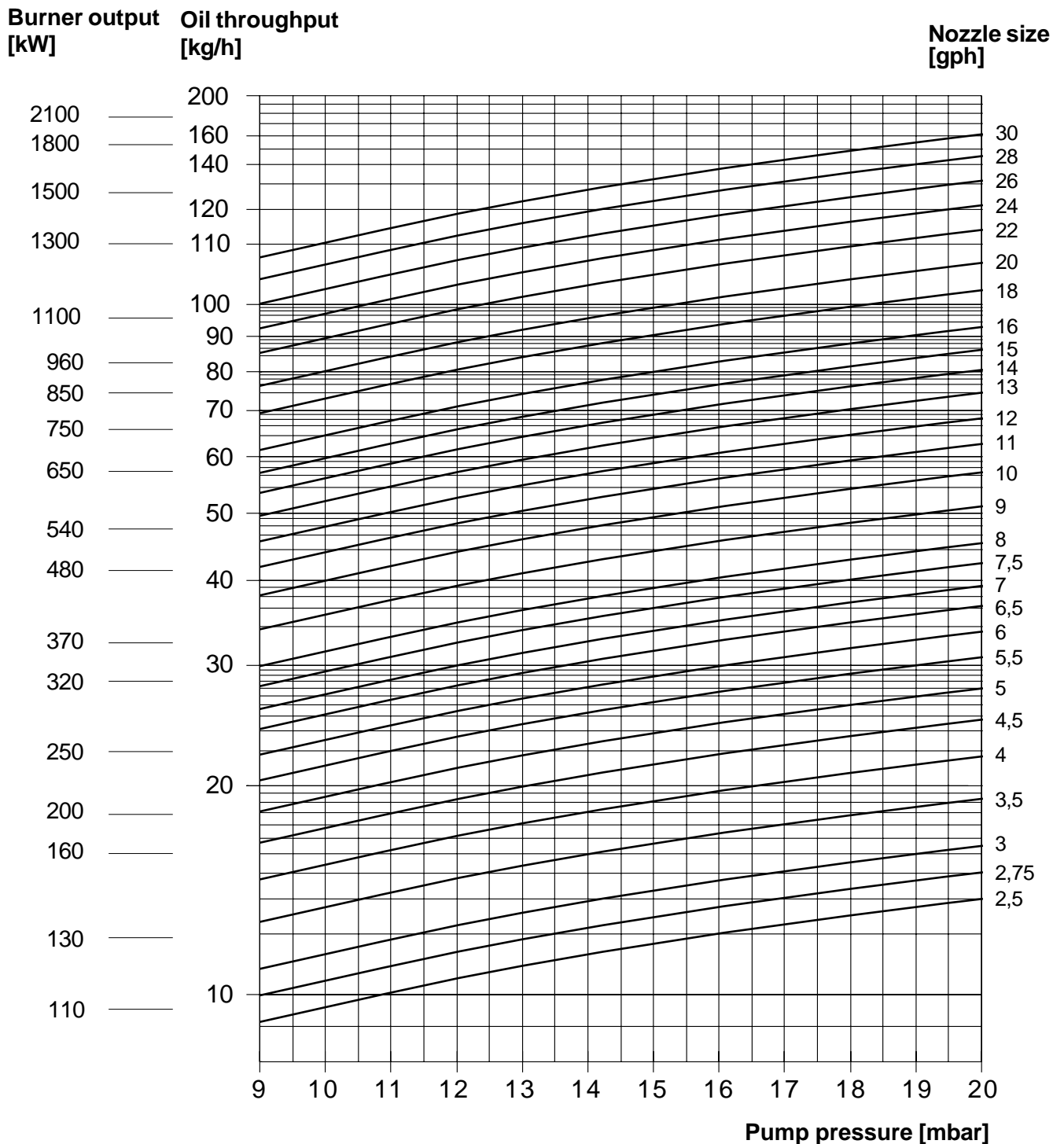
26. Nozzle selection table M3

Burner output [kW]	Output 1st level [kW]	Nozzle 1 60° [USgal/h]	Nozzle 2 60° [USgal/h]	Pump pressure 1st level [bar]	Pump pressure 2nd level [bar]	Oil throughput 1nd level [kg/h]	Oil throughput 2st level [kg/h]	Dimensi on "A" [mm]	Cam position SQN [°]		
									ST1	ST 2	MV2
M3.12											
910	530	8.00	6.00	20	20	45	77	0	17	42	25
980	660	11.0	5.00	20	20	56	83	35	22	42	31
1130	750	12.0	6.0	20	20	63	95	36	24	50	33
1440	820	13.0	10.0	20	20	69	121	36	27	90	31
M3.32											
1840	1210	19.5	11.0	20	20	102	155	18	22	39	25
1970	1320	22.0	12.0	20	20	111	166	20	23	43	25
2230	1470	25.0	13.5	20	20	124	188	27	27	47	29
2500	1600	28.0	15.0	21	21	135	211	37	33	61	36

Nozzle recommendation: Danfoss 60°B, Monarch 60°PLP, Steinen 60°SS

27. Nozzle selection diagram

If the desired output deviates from the values specified in the tables, the nozzle size and pump pressure can be determined with the aid of the following diagram.



Example:

Output: 960kW
Pump pressure: 20bar

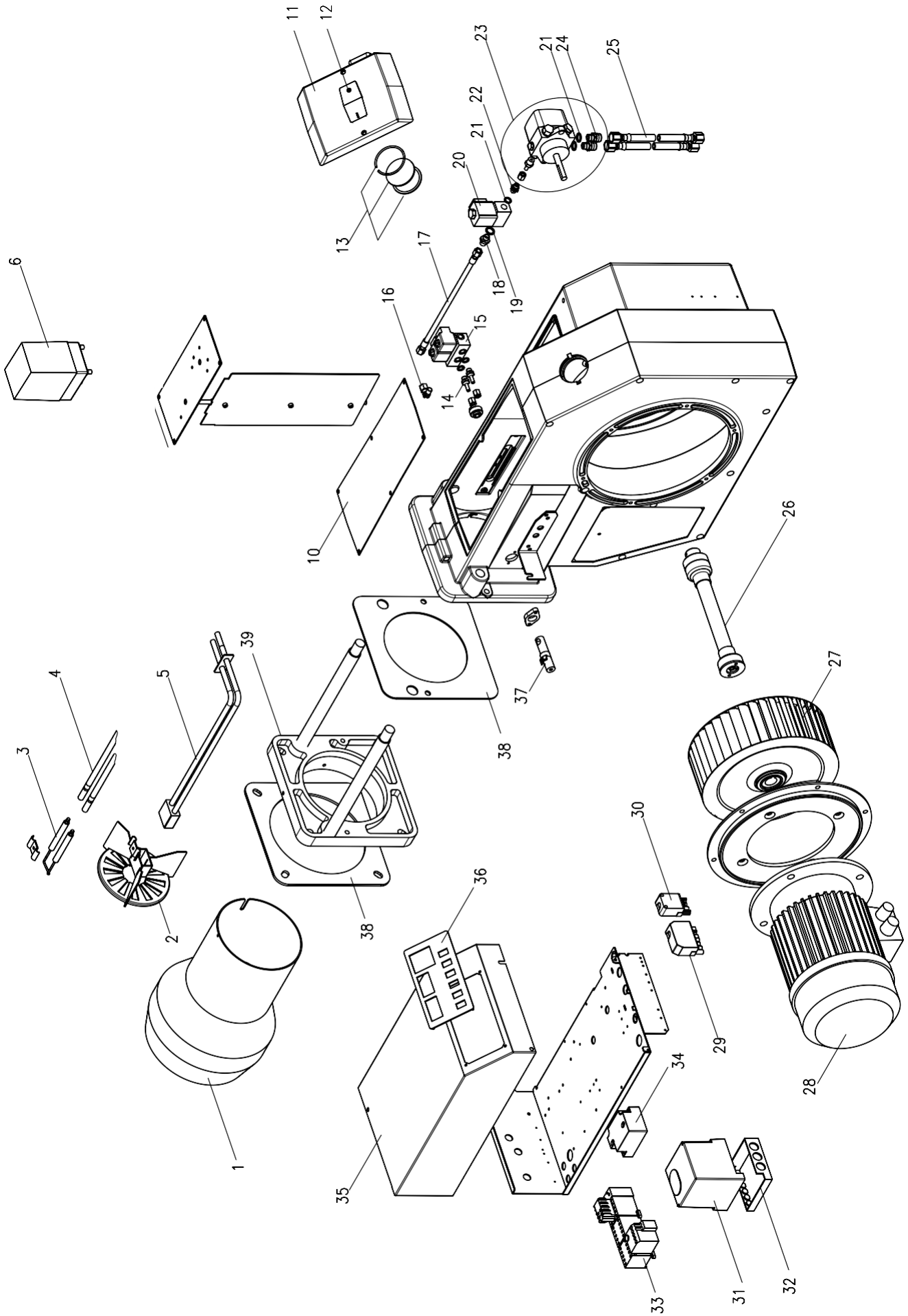
Nozzle 1 assumes 2/3 of the total output.
 $960 \times 0.66 \approx 640\text{kW} \approx 54 \text{ kg/h}$
 $960 \times 0.33 \approx 320\text{kW} \approx 27 \text{ kg/h}$

Nozzle 1 = 10.0gph
Nozzle 2 = 5.0gph

By constraint the points of intersection and numerical values differ slightly in practice.

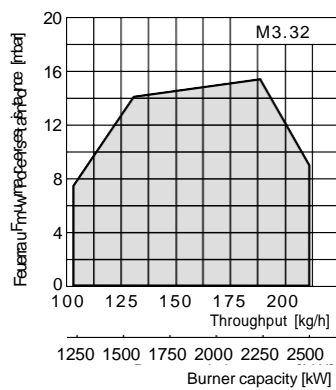
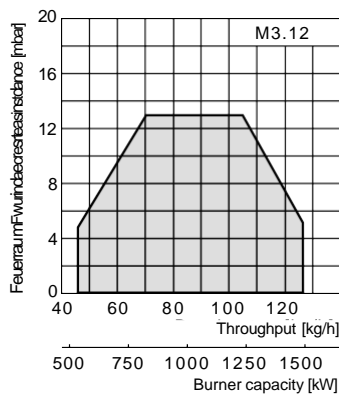
In our example the output of nozzle 1 is therefore somewhat smaller than calculated.

28. Explosion drawing / Spare parts list

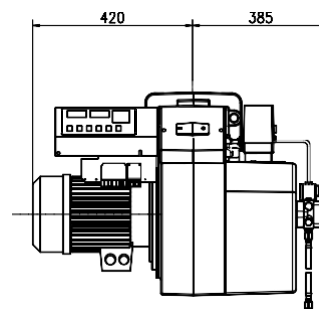
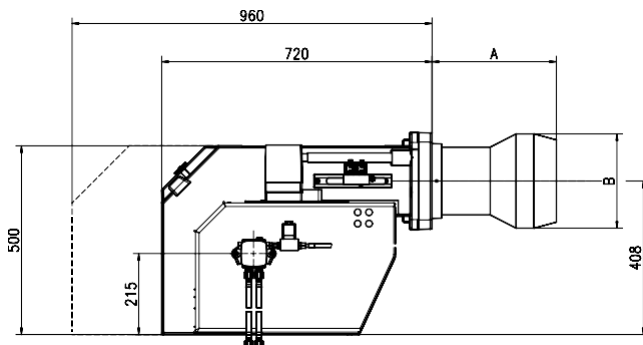


Item	Designation	M3.12-Z-L	M3.32-Z-L
1	Flame tube	46-90-12726	46-90-12971
1	Flame tube extension with 200 mm	47-90-21934	46-90-12991
2	Diffuser with ignition electrode compl.	47-90-22618	47-30-22619
3	Ignition electrode	36-50-11747	36-50-11747
4	Ignition cable 640 mm	47-50-26741	47-50-26741
4	Ignition cable 200mm extension	47-50-26742	47-50-26742
5	Nozzle stock	46-90-12801	46-90-12801
6	Air damper motor SQN 30.111	36-90-11535	36-90-11535
10	Cover for housing	47-90-12982	47-90-12982
11	Hood for sight glass	47-90-24999	47-90-24999
12	Cover for sight glass	47-50-12106	47-50-12106
13	Sight glass with sealing ring	36-90-11544	36-90-11544
14	Union piece solenoid valve/nozzle connection	47-90-20234	47-90-20234
15	Solenoid valve BV01 R1/8' without cable	37-90-10885	37-90-10885
16	Elbow screw-in fitting	47-90-20139	47-90-20139
17	Connecting hose solenoid valve/nozzle connection	47-90-25156	47-90-25156
18	Hose nipple R1/4 x 6 LL	47-50-20862	47-50-20862
19	Seal AL 14 x 10 x 2	37-50-10788	37-50-10788
20	Solenoid valve sv04	36-90-11583	36-90-11583
21	Seal AL 13 x 18 x 2	37-50-11293	37-50-11293
22	Pressure pipe fitting GES 6LLR	47-90-20127	47-90-20127
23	Oil pump cpl.	47-90-26063	47-90-12708
24	Hose nipple R1/4" x R 3/8" / G1/2"-G1/2"	46-50-10554	47-50-12819
25	Oil hose NW 8/10	57-50-10348	47-50-12818
26	Coupling compl.	47-90-26208	47-90-26209
27	Fan incl. coupling	47-90-22579	47-90-22581
28	Motor	47-90-12802	47-90-12804
29	7-pol. female connector, black-brown	37-90-20731	37-90-20731
30	4-pol. female connector, green	37-90-20774	37-90-20774
31	Burnercontrol LAL 1.25	36-90-11536	36-90-11536
32	Burnercontrol base LAL	57-90-10920	57-90-10920
33	Star-deltar starter	47-90-25176-01	47-90-25176-01
33	Thermal overcurrent relay	47-90-25172	47-90-25174
34	Ignition transformer mod. 26/48	47-90-26930	47-90-26930
35	Cover for electrical box	47-90-25206	47-90-25206
36	Switch panelplate	47-90-30357	47-90-30357
37	Flame detector QRB 3	36-90-11537	36-90-11537
38	Gasket set	47-90-27534	47-90-27535
39	Mounting flange with guide rods	46-90-21871	47-30-12909
-	Inlet nozzle	47-90-12785	47-90-12785
-	Motor connection cable	47-90-25410	47-90-25410

29. Working ranges



30. Overall dimensions All dimensions in mm.



	A	B
M3.12	280	205
M3.32	340	280

31. Declaration of conformity

We declare that the Giersch M3 oil blower burner meets the basic requirements of the following directives:

- „Elektromagnetic Compatibility“ according to directive 2004/108/EEC
- „Machine Directive“ according to directive 2006/42/EEC together with DIN EN 60204-1
- „Efficiency Directive“ according to directive 2006/42/EEC together with DIN EN 267 / Ed. 10.91

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Subject to alterations.

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