

**Service Manual**  
**English**

**MULTIMAT<sup>®</sup>**  
**—— MACH 2**

**MULTIMAT<sup>®</sup>**  
**—— MACH 3**

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**DENTSPLY**  
**DeTREY**

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D-63264 Dreieich

## Mach 2

Pos.	Description
1	Firing Platform
2	O-Ring For Lift Platform
3	Lift Platform With O-Ring
4	Heat Sink, Black Anodized
5	Microprocessor, German Microprocessor, English Microprocessor, French
6	Toothed Belt, 285 L
7	Fuse, 315 mA/250 V Fuse, 800 mA/100-115 V
8	Gear Motor
9	Rubber Foot, With Screwing Rubber Foot, Self-Adhesive
10	Micro Switch
11	Lift Platform Seal
12	Safety Lab Socket, White
13	Hose Connector - Metal Hose Connector - Plastic
14	Safety Lab Socket, Red
15	Power Line, 220 V Power Line, 100-115 V
16	Fuse, 10.0 A/250 V Fuse, 15 A/100-115 V
17	Build-in Receptacle
18	Mains Supply Failure Cut Out, 230 V Mains Supply Failure Cut Out, 100-115 V
19	Radio Interference Filter, F011126
20	Transformer, EV 3793 Transformer, EV 3793 A
21	3/2 Solenoid Valve
22	2/2 Solenoid Valve
23	Capacitor, Assembled, 26µF
24	Plastic Crossed Connector
25	Thermocouple Compensating Line
26	Silicone Hose p. Metre Spiral Spring p. Metre
27	Silicone Seal, 3 mm
28	Top Terminal Insulation* Top Terminal Insulation**
29	Insulation Insert
30	Terminal Stud, Complete Silicone Seal 5 mm, For Terminal Stud
31	Silicone Line, Complete
32	Barlan Disc, 170 x 1 mm Barlan Disc, 170 x 2 mm
33	O-Ring; 190.1 x 3.5
34	Thermocouple, Complete* Thermocouple, Complete**
35	<b>Heating Muffles</b> 220/230 V - 1200/1300 W - 40 ohms 115 V/1200 W 240/230 V - 1200/1100 W - 48 ohms
36	Alu Vessel*** Alu Vessel****
37	Shock Absorber For Toothed Belt

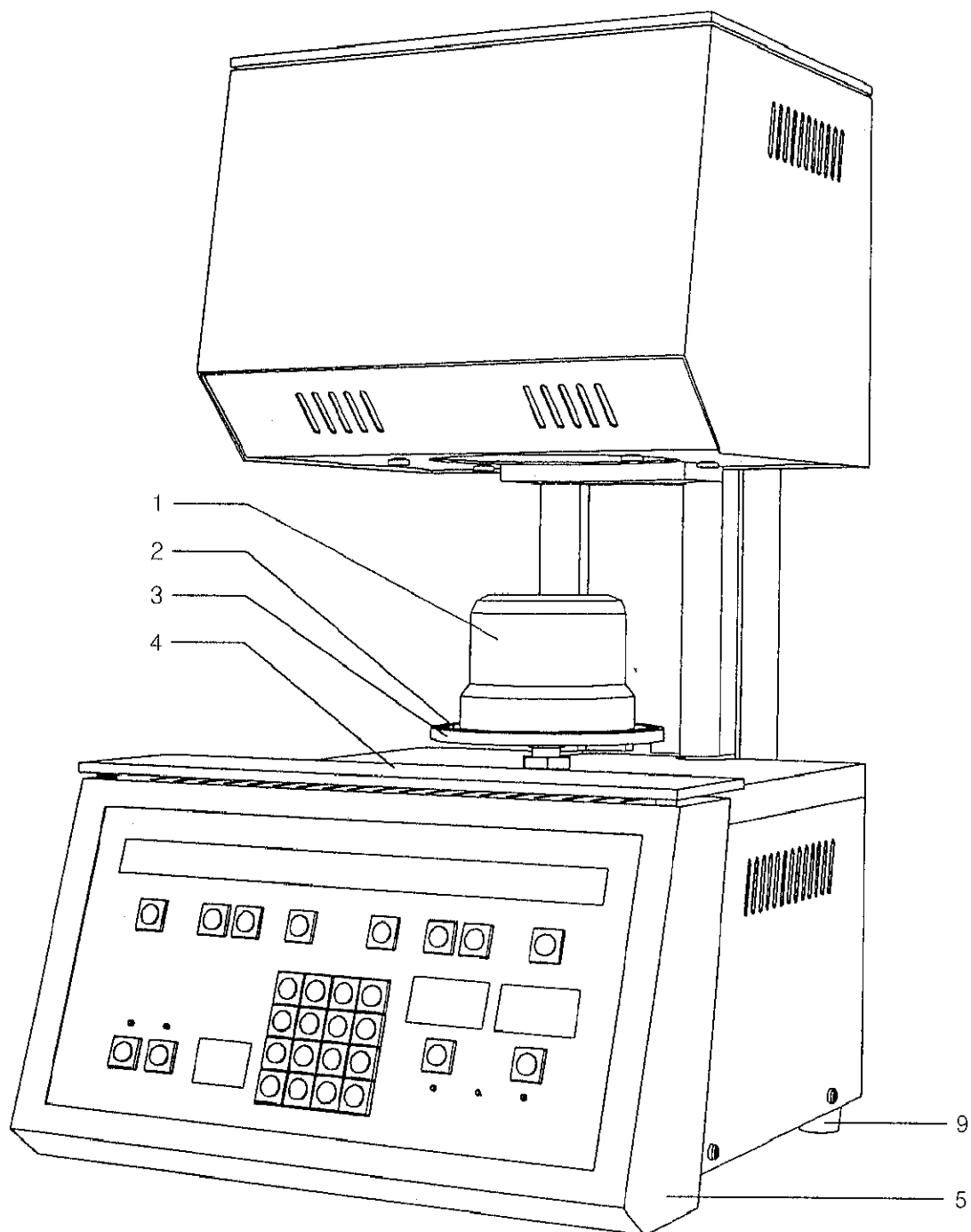
## Mach 3

Pos.	Description
1	Firing Platform
2	O-ring for Firing Platform Support
3	Firing Platform Support with O-ring
4	Heat Sink, silver anodized
5	Microprocessor Mach 3
6	Toothed Belt, 285 L
7	Fuse, 315 mA 250 V Fuse, 800 mA 100-110 V
8	Gear Motor
9	Rubber Foot
10	Micro Switch
11	Firing Platform Support Seal
12	Safety Lab Socket, White
13	Hose Connector, 1/8"
14	Safety Lab Socket, Red
15	Power Line, German Power Line, English Power Line, American
16	Fuse, 19201 10.0 A 250 V Fuse, 15 A, 120 V
17	Build in Receptacle, German Build in Receptacle, American
18	Ground Fault Interceptor, 230 V Ground Fault Interceptor, 110 V
19	Radio Interference Filter, F011126
20	Transformer, EV 3793
21	3/2 Solenoid Valve
22	2/2 Solenoid Valve
23	Capacitor, assembled
24	Plastic Crossed Connector
25	Thermocouple Compensating Line
26	Silicone Hose p. metre Spiral Spring p. metre
27	Silicone Seal, 3 mm
28	Top Terminal Insulation
29	Insulation Insert
30	Terminal Stud, complete Silicone Seal for Terminal Stud
31	Silicone Line, complete
32	Insulation disc, 170 x 2
33	O-ring, 190, 1 x 3,5
34	Thermocouple, complete
35	Heating Muffle 230 V 1300 W Heating Muffle 100 V 1200 W Heating Muffle 115 V 1200 W
36	Alu Vessel
37	Memory Card 256
38	Ribbon Cable with Multiple Connector
39	Calibration Platform
40	Vacuum Pump Hose complete
41	Shock Absorber for Toothed Belt

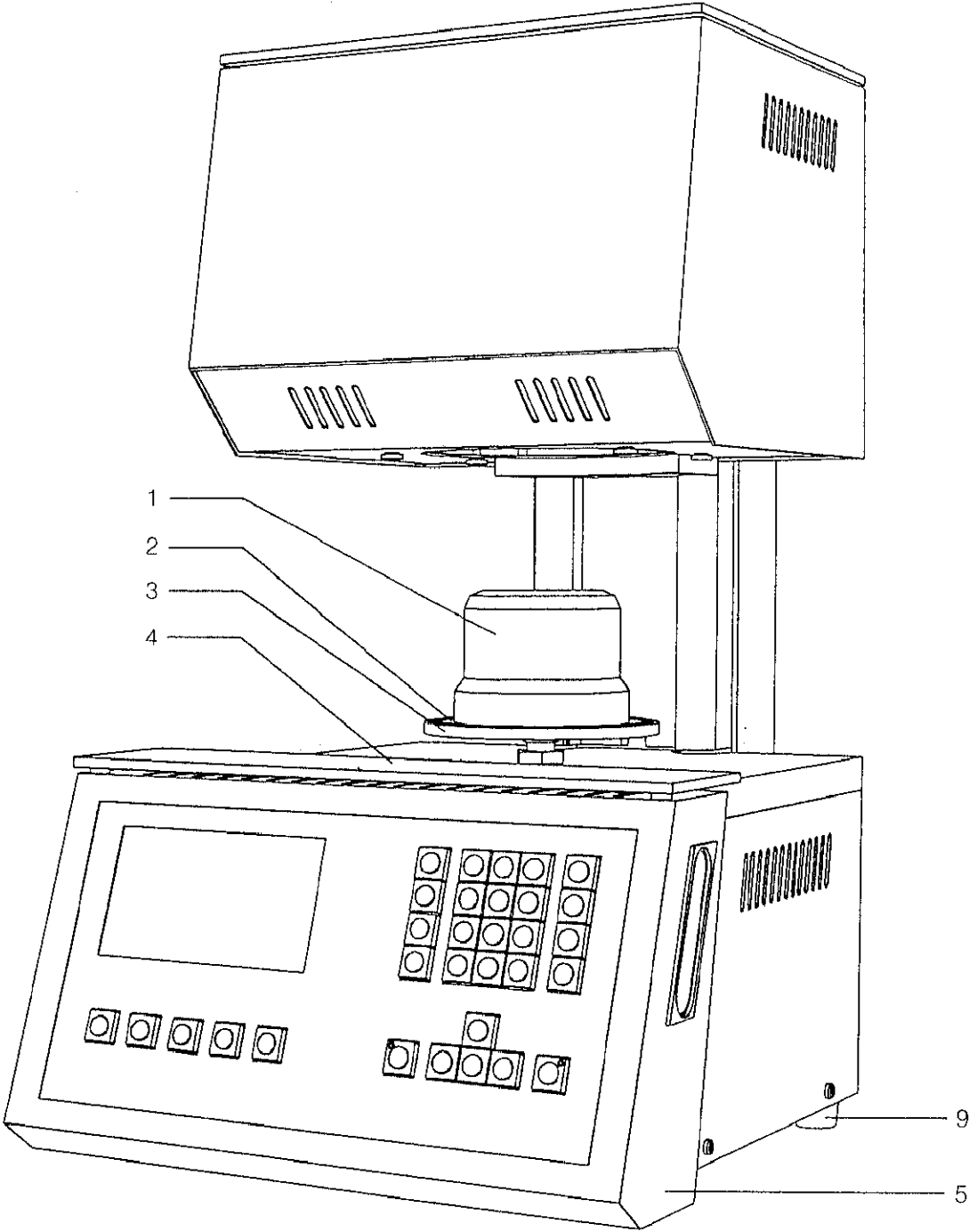
- \* Mach 2 Furnaces up to Serial Number 2355  
 \*\* Mach 2 Furnaces from Serial Number 2356  
 \*\*\* Mach 2 Furnaces up to Serial Number 2099  
 \*\*\*\* Mach 2 Furnaces from Serial Number 2100

# Mach 2

Front view

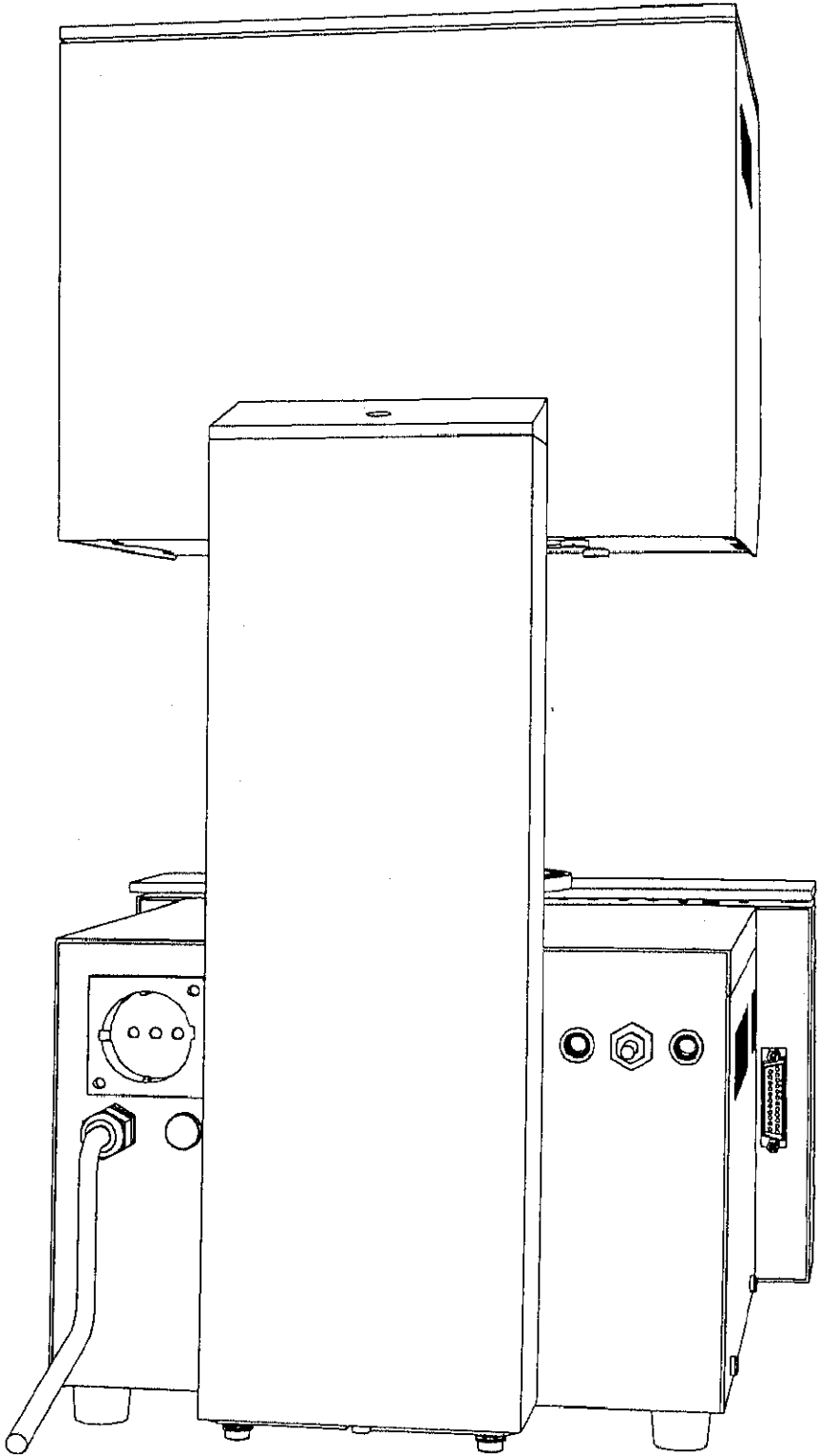


Mach 3  
Front view

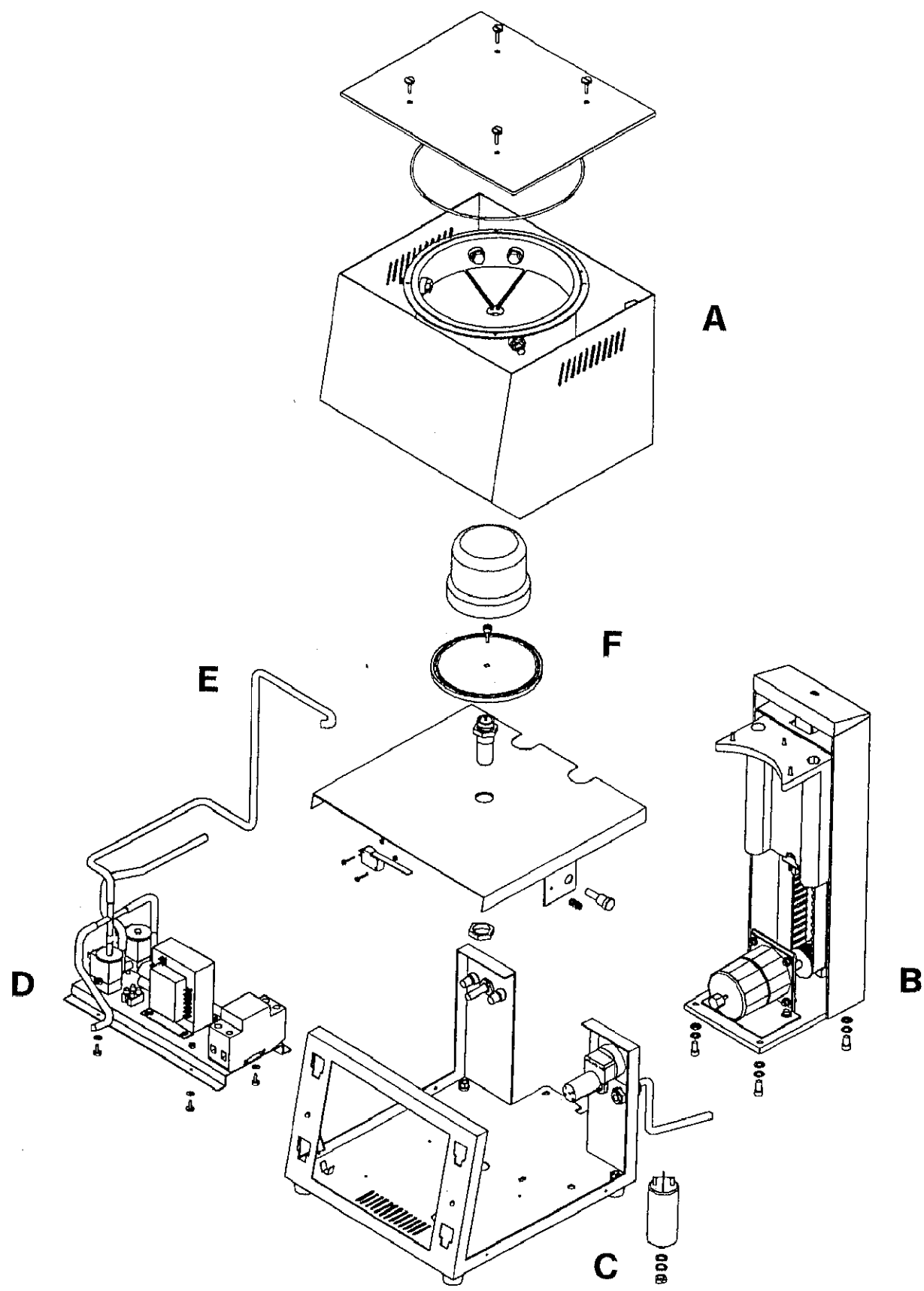


Mach 2 / Mach 3

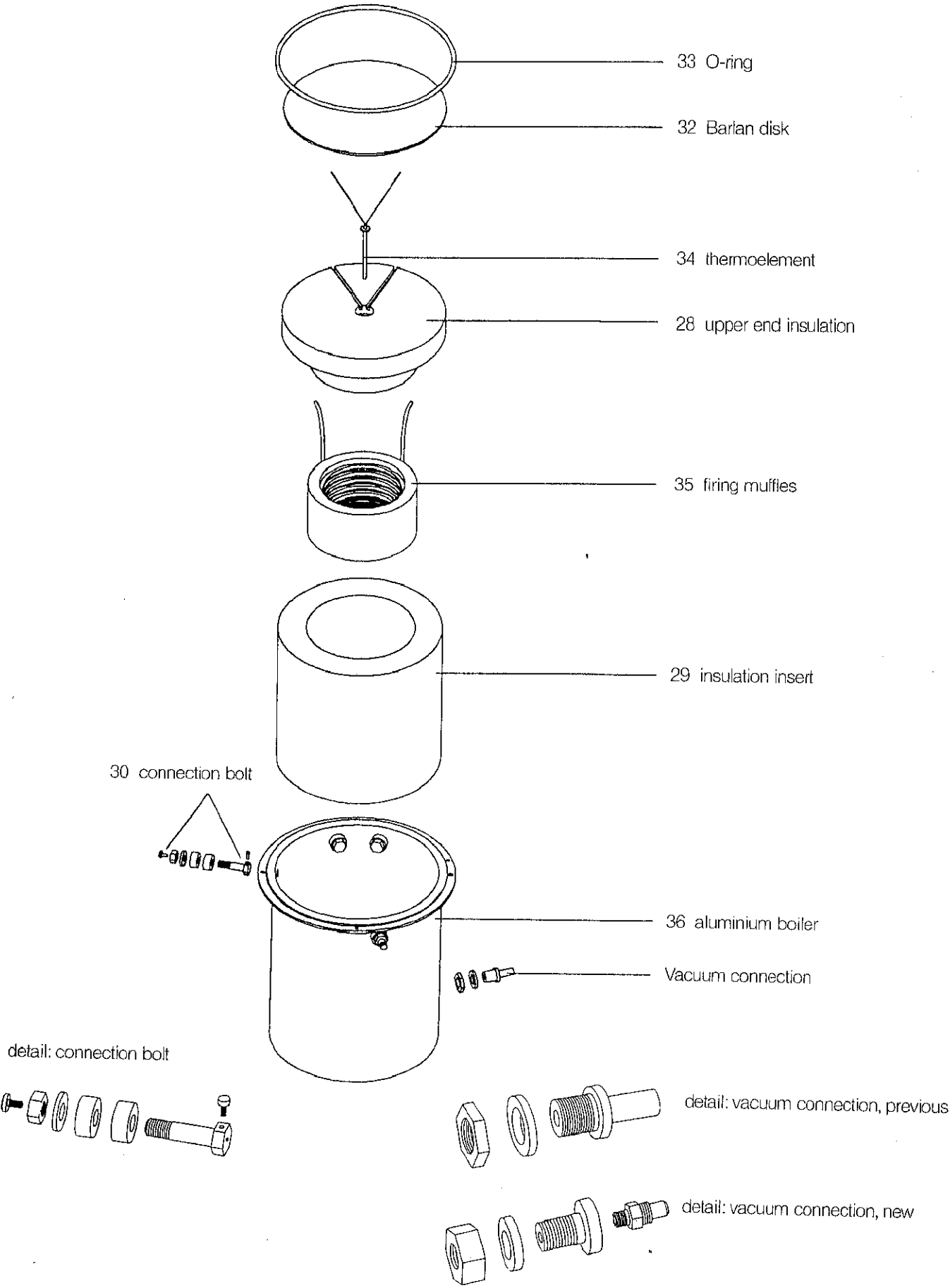
Rear view



Mach 2 / Mach 3  
Assembly of components A-F

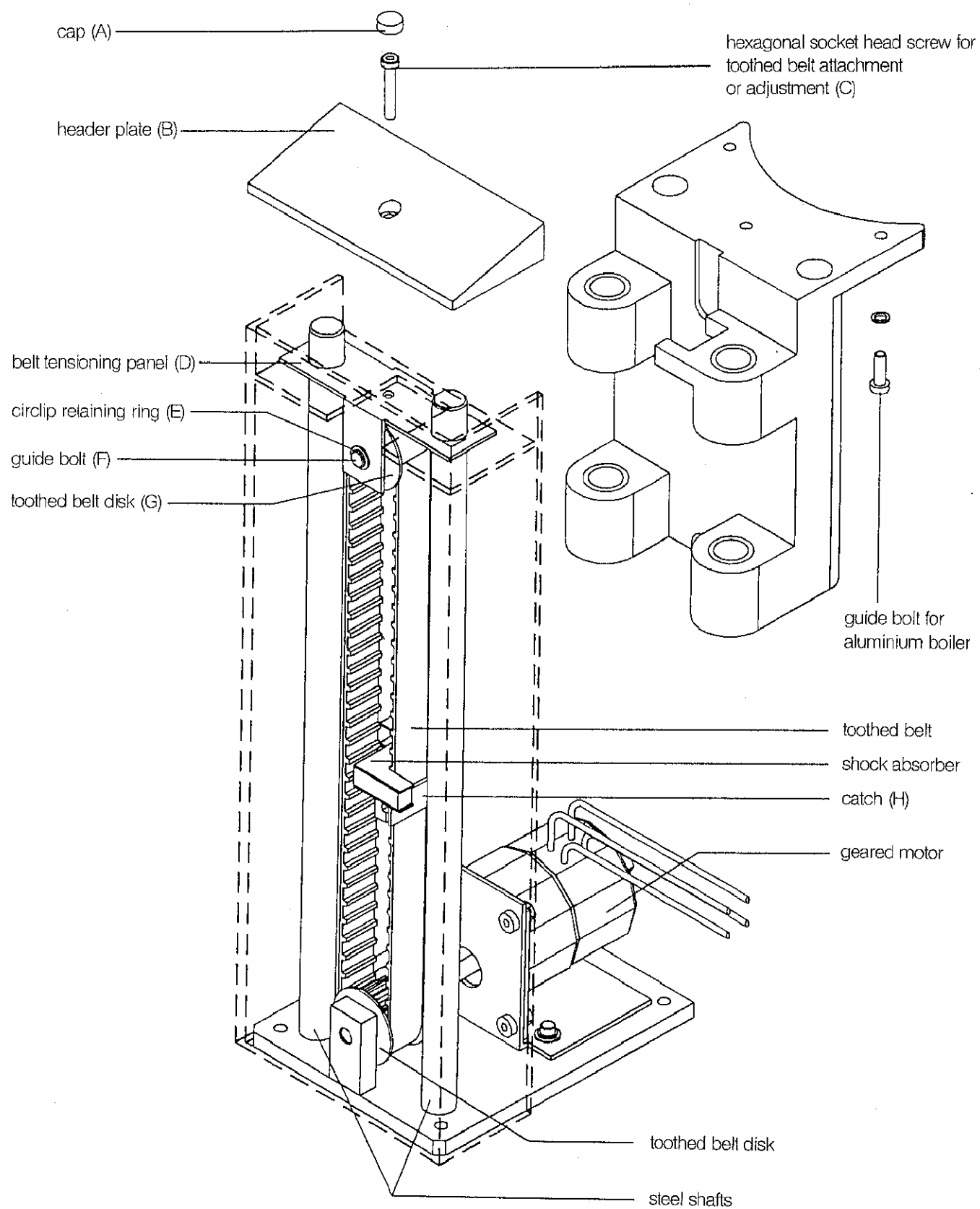


Mach 2 / Mach 3  
Furnace, Component A



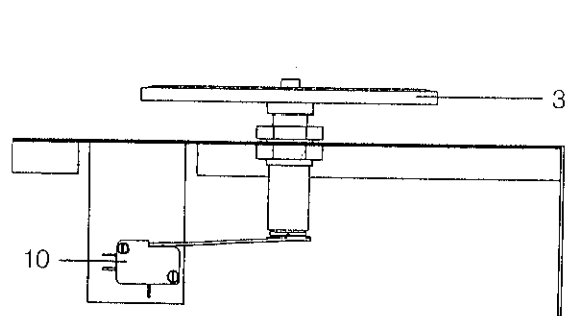
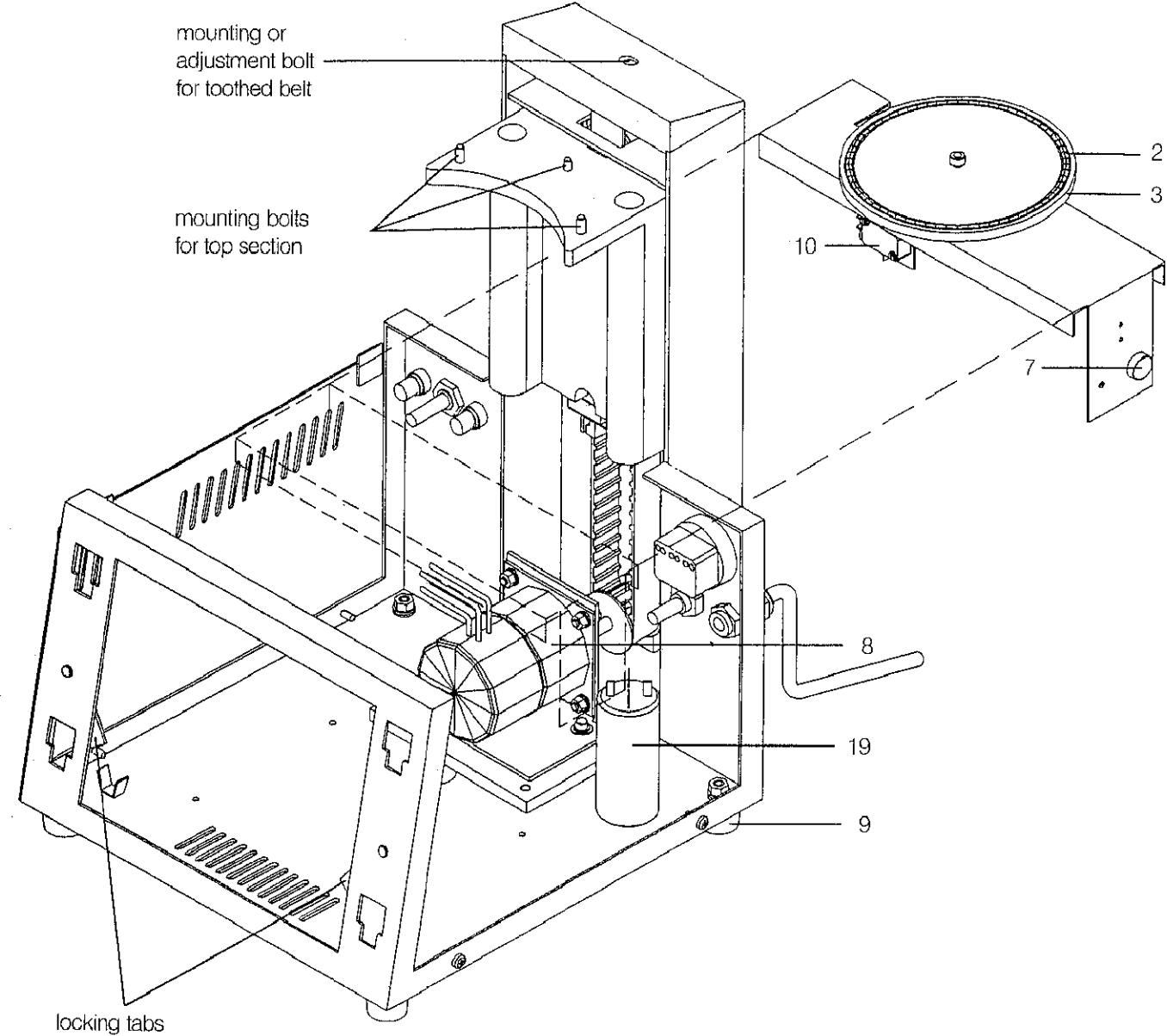
## Mach 2 / Mach 3

### Lift device, Component B

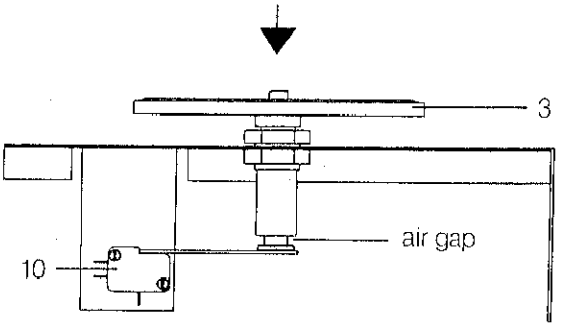




Mach 2 / Mach 3  
Housing, Component C

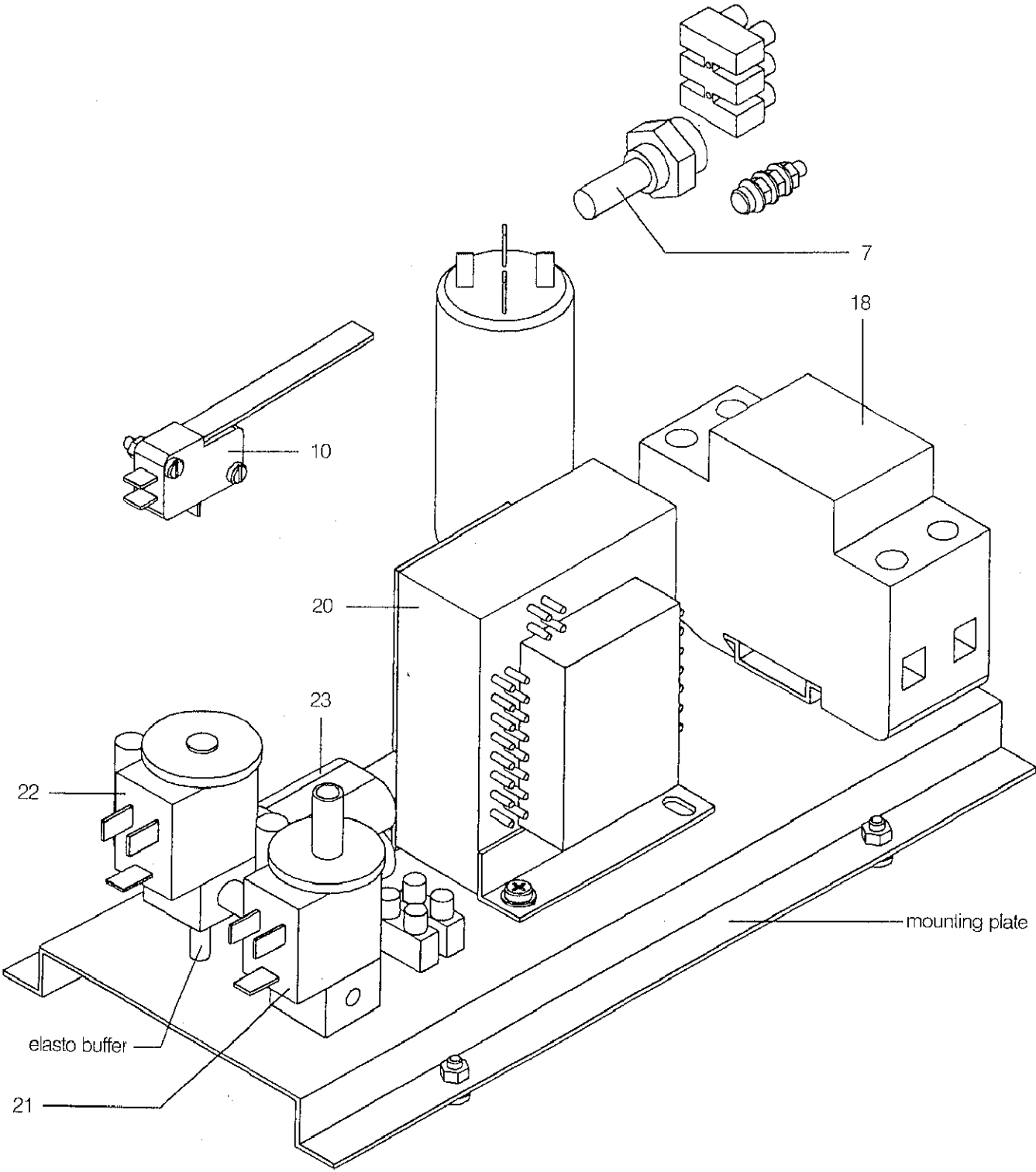


detail: limit switch adjustment, open



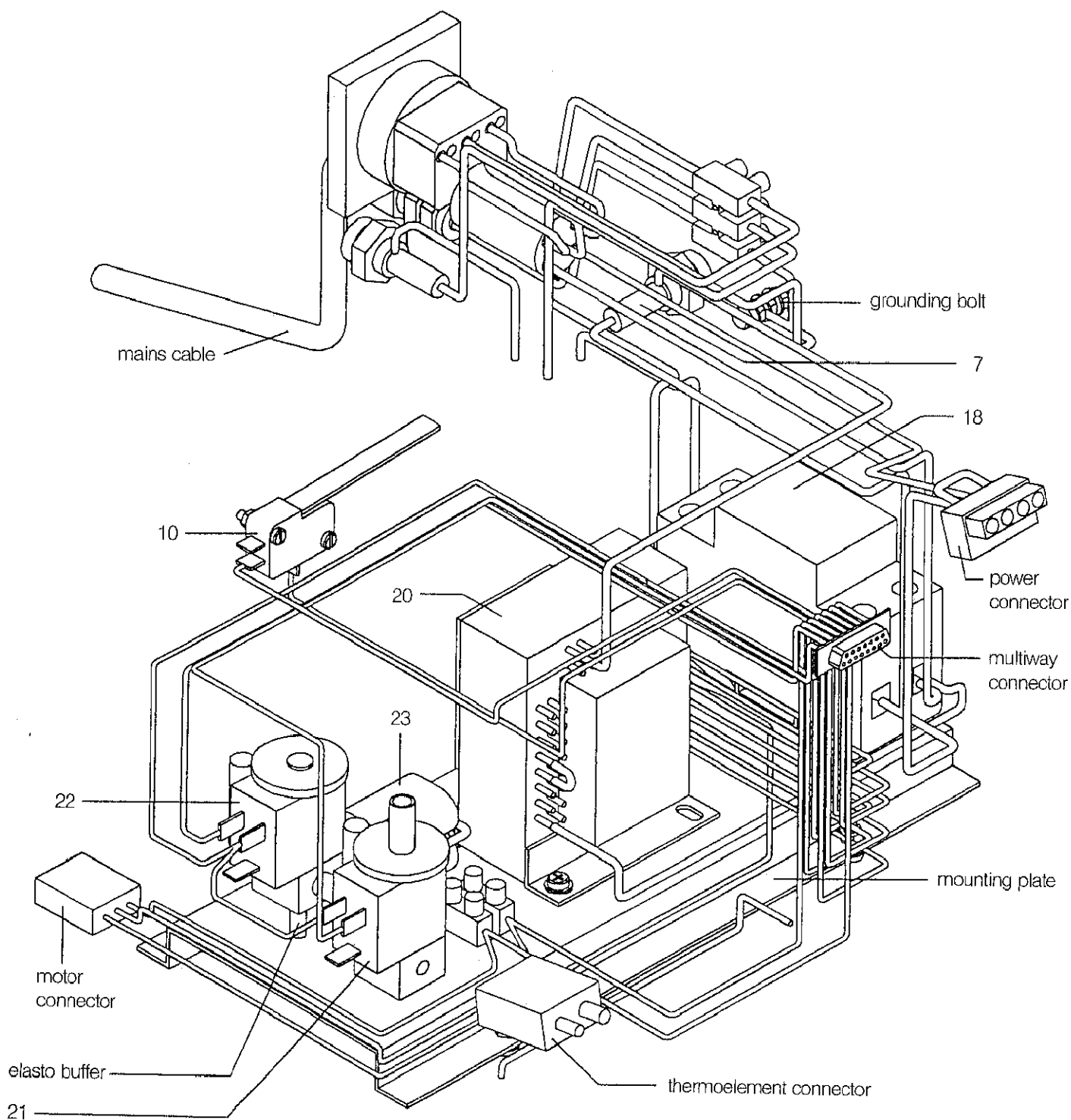
detail: limit switch adjustment, closed

Mach 2 / Mach 3  
Electrics, Component D



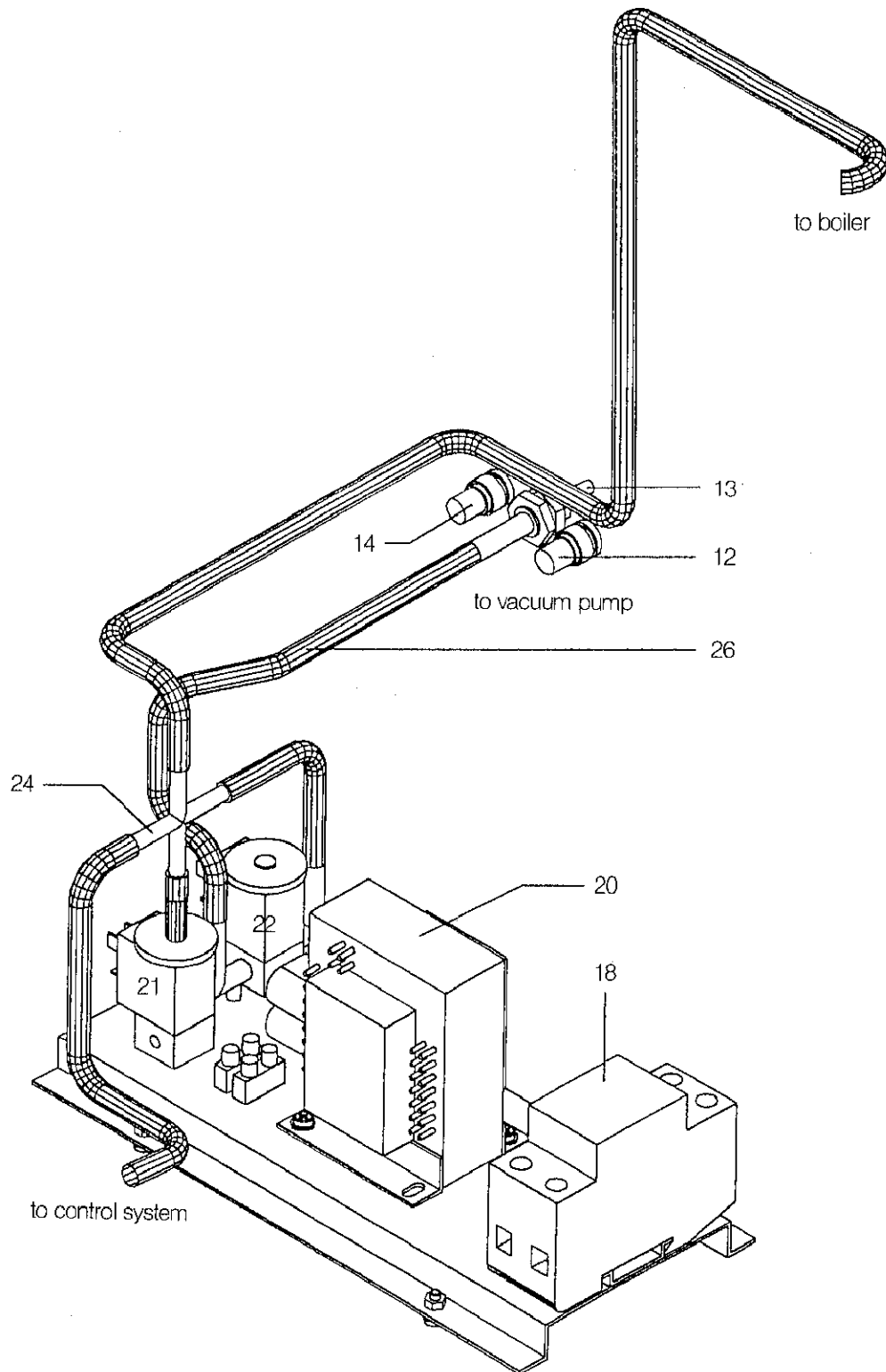
## Mach 2 / Mach 3

### Wiring, Component D



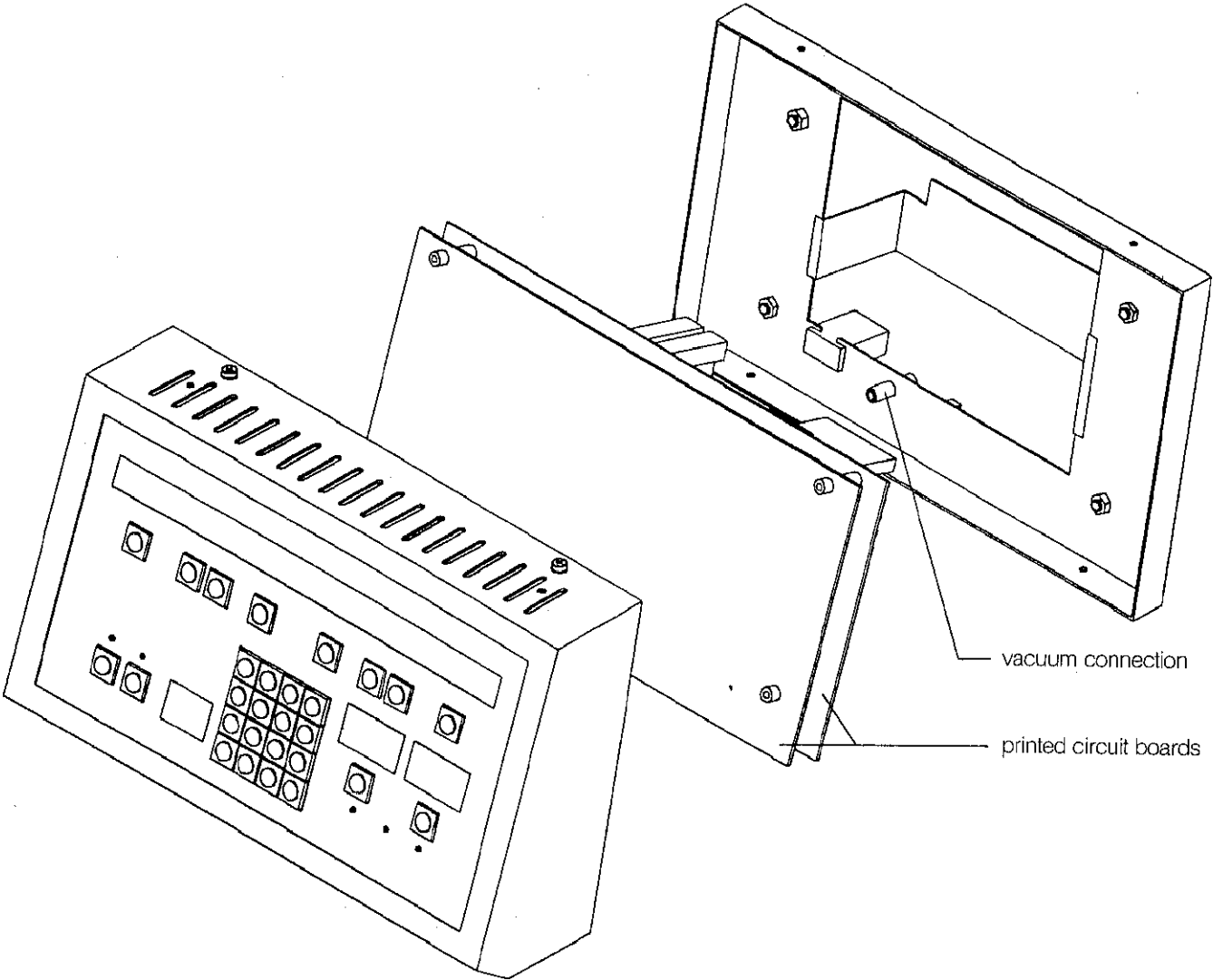
## Mach 2 / Mach 3

### Vacuum system, Component E



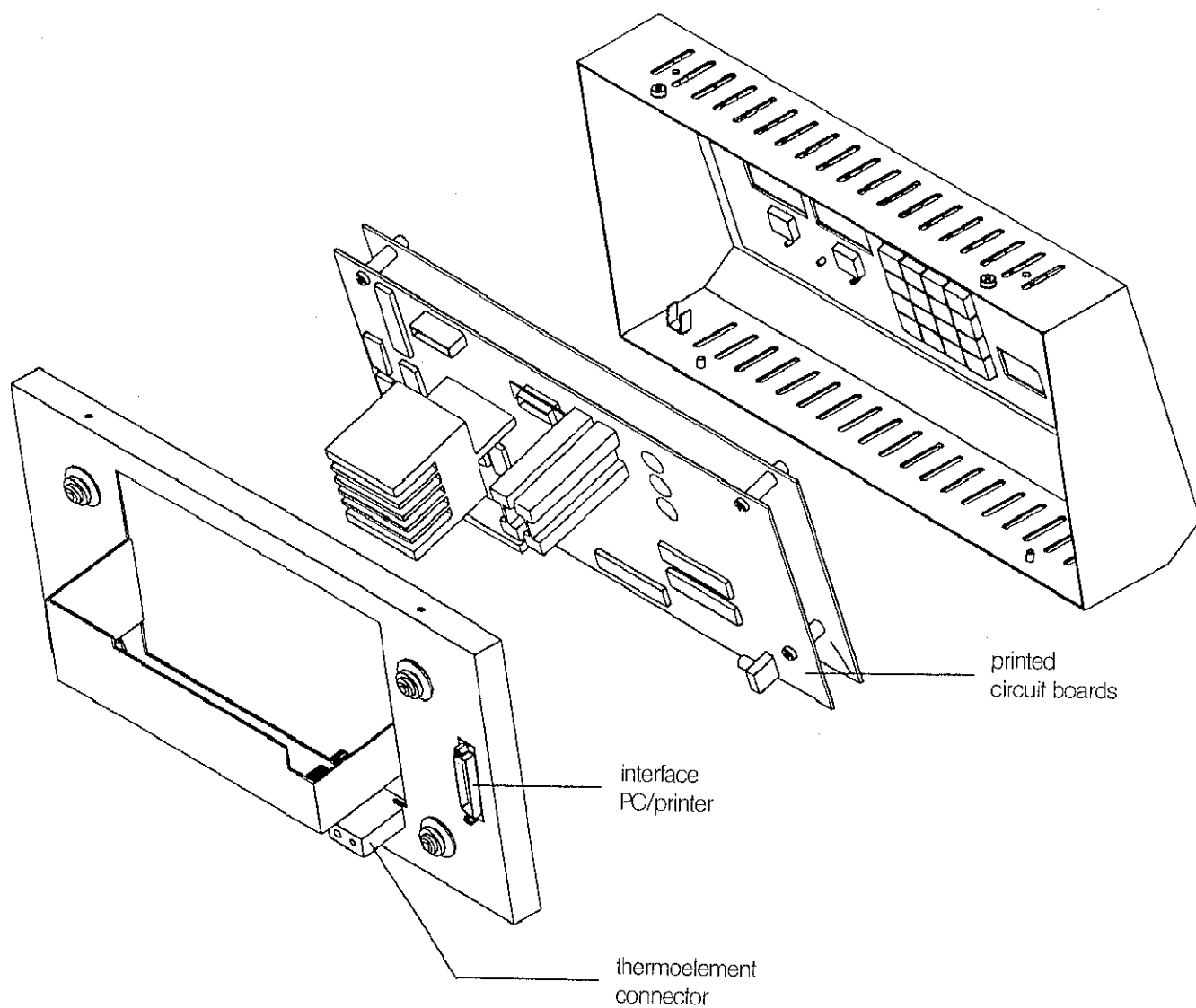
Mach 2

Control unit, Front view



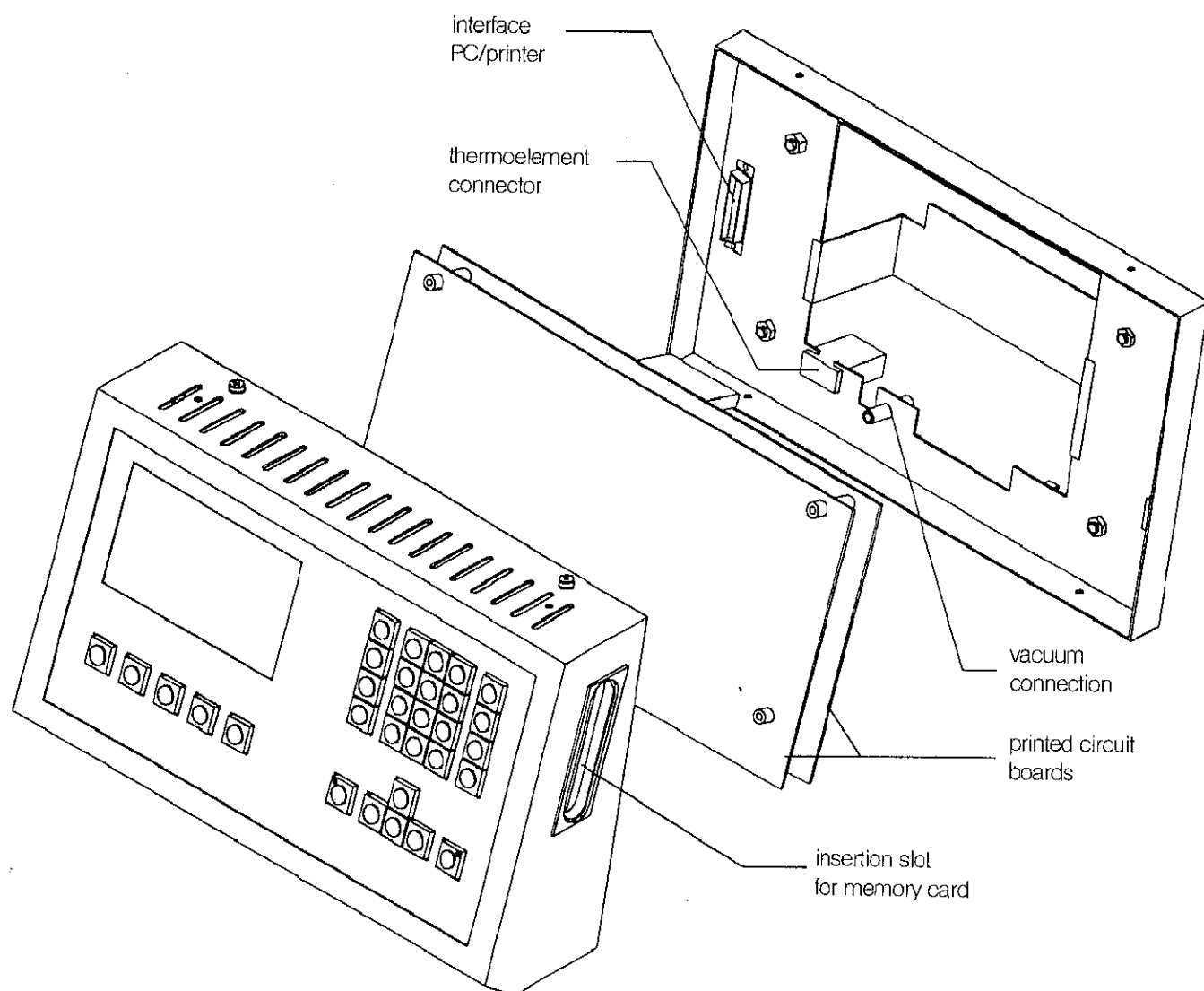
## Mach 2

### Control unit, Rear view

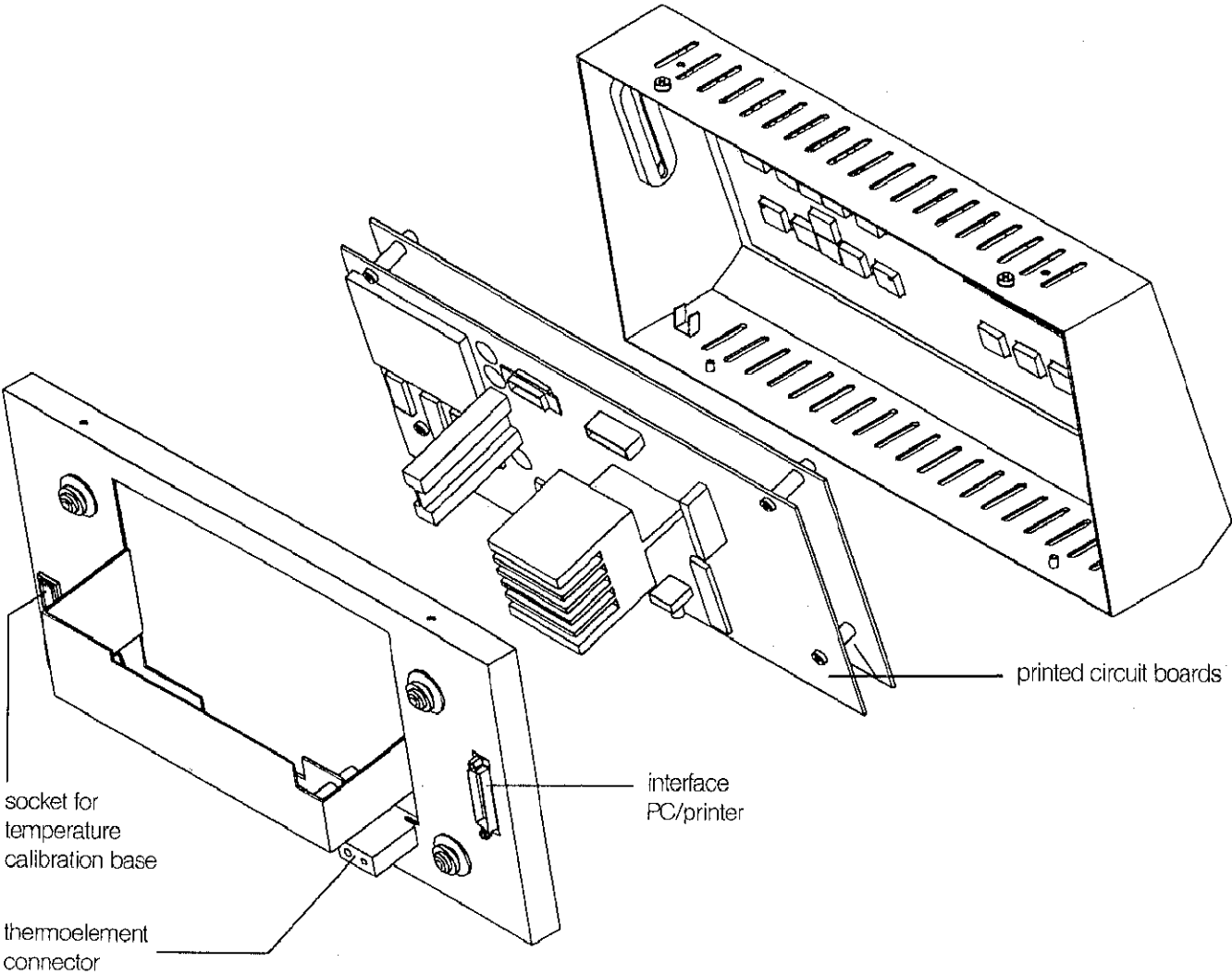


# Mach 3

## Control unit, Front view



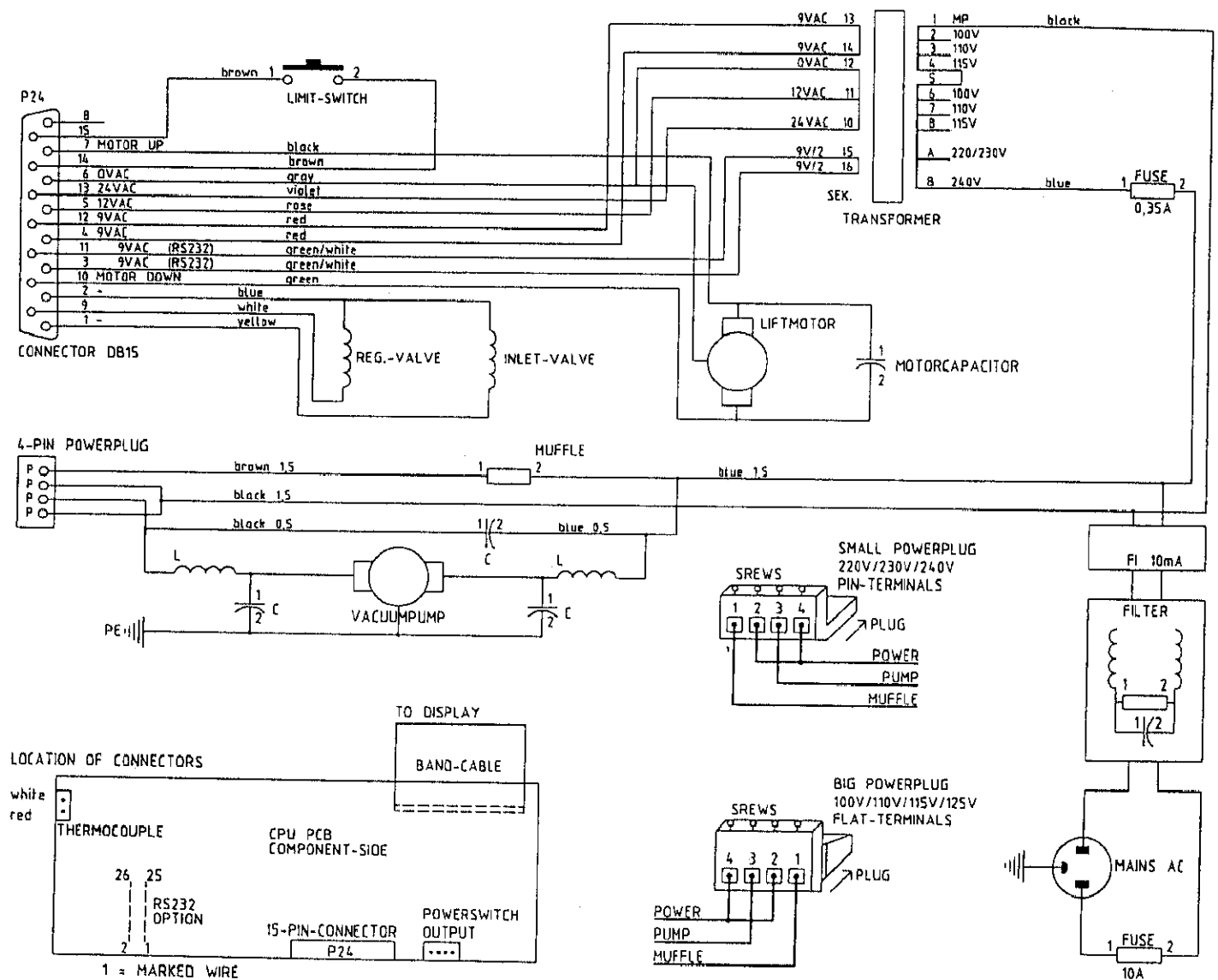
Mach 3  
Control unit, Rear view





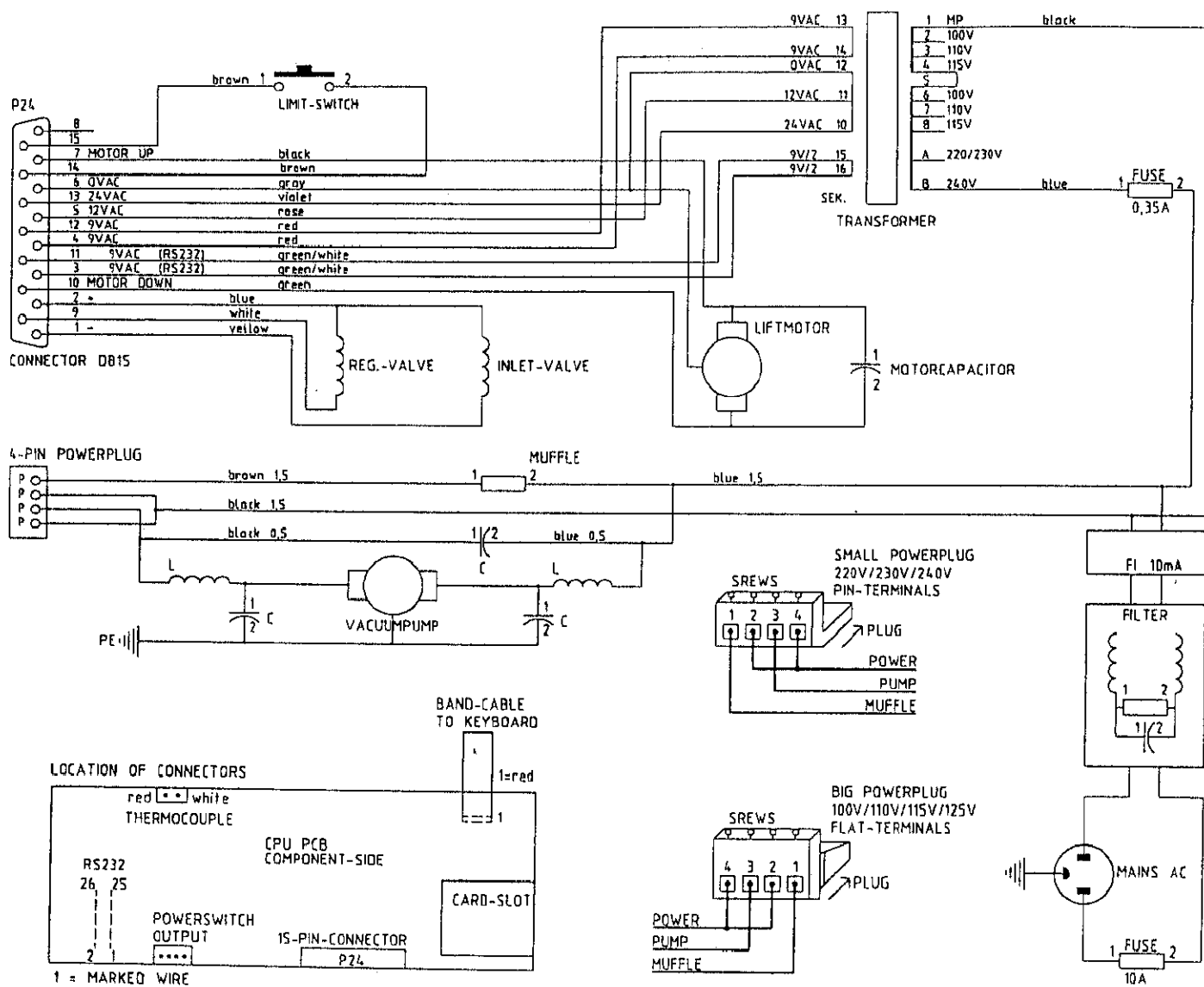
# Mach 2

## Furnace wiring, Component D



# Mach 3

## Furnace wiring, Component D



## Replacement – Toothed Belt

### Removal:

1. Disconnect mains plug.
2. Remove geared motor and microprocessor control unit.  
See „Replacement – Geared motor“ instructions, items 2 through to 7.
3. Remove top section:
  - a) Undo and remove 4 bolts.
  - b) Remove cover and Barlan disk.
  - c) Remove electrical connections (4x) at the connection bolts.
  - d) Remove 4 Mounting bolts from below the aluminium boiler.
  - e) Lift up aluminium boiler and pull off silicon hose from hose connection piece. Remove boiler.
  - f) Cut off cable ties on the connection wires and the silicon hose; then withdraw cable and hose from duct, via the bottom section.
  - g) Remove cooling jacket by undoing 3 bolts on the support below the cooling jacket.
4. Remove cap (A) (Fig. B) (synthetic material).
5. Unscrew bolt (C) in header plate (B).
6. Remove header plate (B).
7. Withdraw belt tensioning plate (D) complete with toothed belt in an upward direction. (Please note assembled position: the bores for the steel shaft are not centrally located – narrow end to the rear).
8. Remove a circlip retaining ring (E) at the belt tensioning plate, withdraw guide bolt (F). Remove toothed belt disk (G) from tensioning plate and detach toothed belt.
9. Unscrew catch (H) from toothed belt. (2 screws)  
Important: Please note assembled position. Thin section to the outside onto smooth toothed belt surface. Thick section must face toothed surface. When assembled, this catch must be located on the left-hand toothed belt side.

### Fitting:

In reverse order.

Please note all instructions.

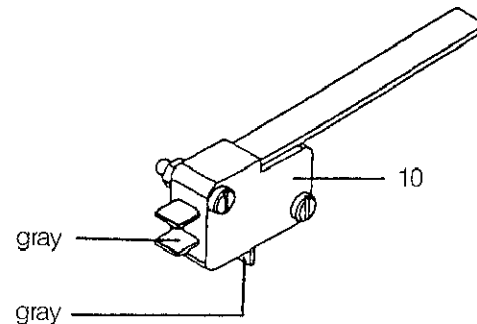
## Replacement – Microswitch

### Removal:

1. Disconnect mains plug.
2. Unscrew side panels.
3. Remove microprocessor:
  - a) Swing locking tabs inwards.
  - b) Lift up control housing and pull towards the front.
  - c) Disconnect all connectors and protective conductors.
  - d) Pull off vacuum hose.
4. Lift up top section by hand and, by means of a wooden block or similar (height: 5 cm approx.) support relative to the bottom section.

5. Unscrew two brass nuts (M3) from the microswitch (item 10) on the mounting panel, and remove switch complete with bolts and insulation plate.

### Layout:



6. De-solder connection wires.

### Fitting:

In reverse order.

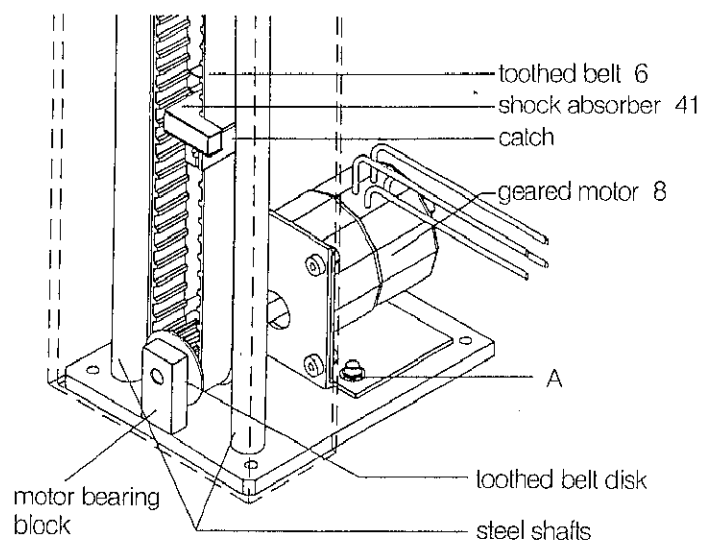
Following reassembly, the switching point of the microswitch must be readjusted. When the top section is lowered, the microswitch will be operated. The switching arm must then still be able to allow itself to be moved down a little further.

See drawing „Component C“ – detail: limit switch adjustment, closed. The air gap should be 3 mm, with the microswitch being pressed.

## Replacement – Geared motor

### Removal:

1. Disconnect mains plug.
2. Unscrew side panels.
3. Remove microprocessor control unit:
  - a) Swing locking tabs inwards.
  - b) Lift up control housing and pull towards the front.
  - c) Pull off all connectors and protective conductors.
  - d) Pull off vacuum hose.
4. Lift up top section by hand and, by means of a wooden block or similar (height: 16 cm approx.) support relative to the bottom section.
5. Disconnect connector from motor to control unit.
6. Unscrew two bolts (A) on the motor floor mounting bracket.
7. Pull motor towards the front, detach toothed belt (item 6).



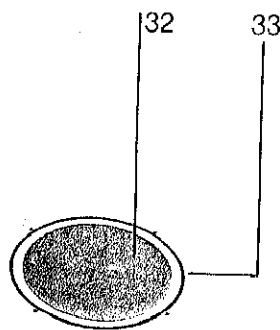
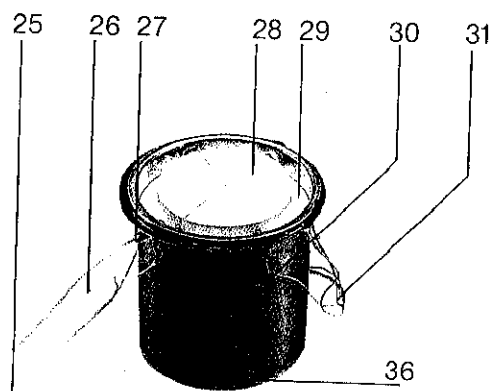
### Fitting:

1. Fit toothed belt disk of motor to toothed belt, push motor shaft into motor bearing block.  
Important: distance of motor bearing block to toothed belt disk 0.5 mm (adjust).
2. Screw in, adjust, and tighten two bolts (A): motor mounting bracket.
3. Reconnect motor/control unit connector.
4. Move down top section manually.
5. Fit microprocessor – follow removal instructions in reverse order.
6. Fit side panels.
7. Test run.

## Replacement – Solenoid Valve

### Removal:

1. Disconnect mains plug.
2. Unscrew side panels.
3. Remove microprocessor control unit:
  - a) Swing locking tabs inwards.
  - b) Lift up control housing and pull towards the front.
  - c) Pull off all connectors and protective conductors.
  - d) Pull off vacuum hose.



4. Unscrew four mounting bolts for mounting plate from the underside of the unit.
5. Detach differential-current switch (item 18) from mounting plate.
6. Withdraw mounting plate on left-hand side until solenoid valves are easy to access.
7. Pull off electrical connections and vacuum hoses.
8. Remove valves by means of two bolts or nuts from mounting plate floor.

### Information:

2/2-way solenoid valve has been soundproofed against the mounting plate by means of two elasto buffers.

### Fitting:

Follow above instructions in reverse order.

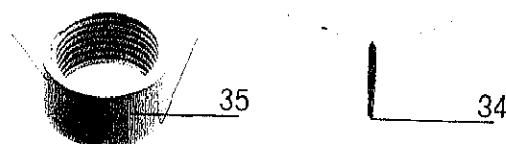
### Note:

On units supplied with effect from October '97 (from MACH 2 no. 3170, MACH 3 no. 2316), there are now feedthrough holes in the mounting plate to allow valve mounting bolts to be directly accessed. In the case of such units, removal instructions nos. 4 to 6 will therefore be no longer required.

## Replacement – Insulation Insert

### Removal:

1. Disconnect mains plug.
2. Undo and remove cover bolts (item 33).
3. Lift up cover (if the cover is tightly bonded, insert a screwdriver with the flat of its blade underneath the cover and lift up).
4. Remove Barlan disk (item 32).
5. Undo thermoelement connections, withdraw wires and withdraw complete thermoelement (item 34) with two-hole bar in an upward direction.
6. Remove top seal block (item 28) in an upward direction.



7. Undo firing muffle connections, withdraw wires, carefully withdraw firing muffle (item 35) in an upward direction.

8. Remove connection bolts 4x (item 30):

- a) Unscrew connection wires (items 25 + 31).
- b) Remove mounting bolts for thermoelement and firing muffle.
- c) Unscrew brass nuts, pull off brass disk and Frequentia bushing.
- d) Pull connection bolt towards the inside and remove.

**Information:**

- A. The vacuum connection is located in the bottom section of the aluminium boiler (item 36) and will not be removed when replacing the insulation insert.
- B. In older units, the vacuum connection is located in the top section of the aluminium boiler and must be

removed by pulling off the vacuum hose, undoing the brass nut, and withdrawing the connection.

- C. The insulation insert can now be withdrawn from the aluminium boiler in an upward direction.

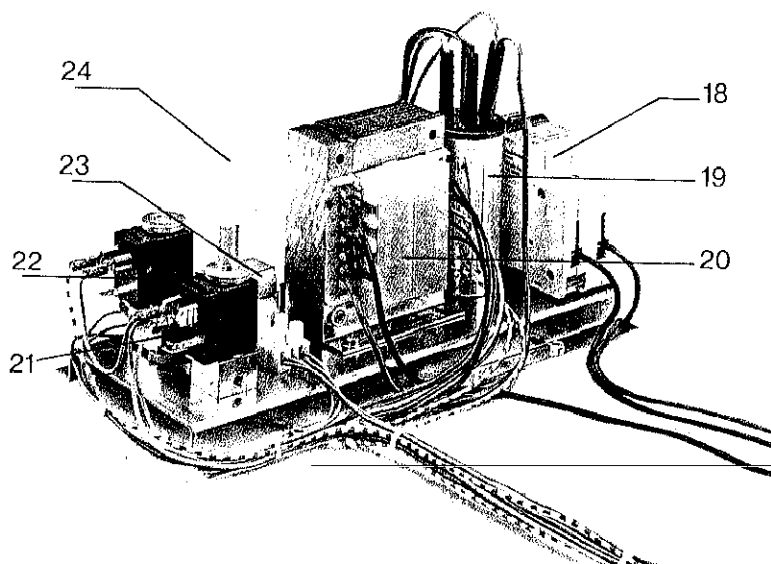
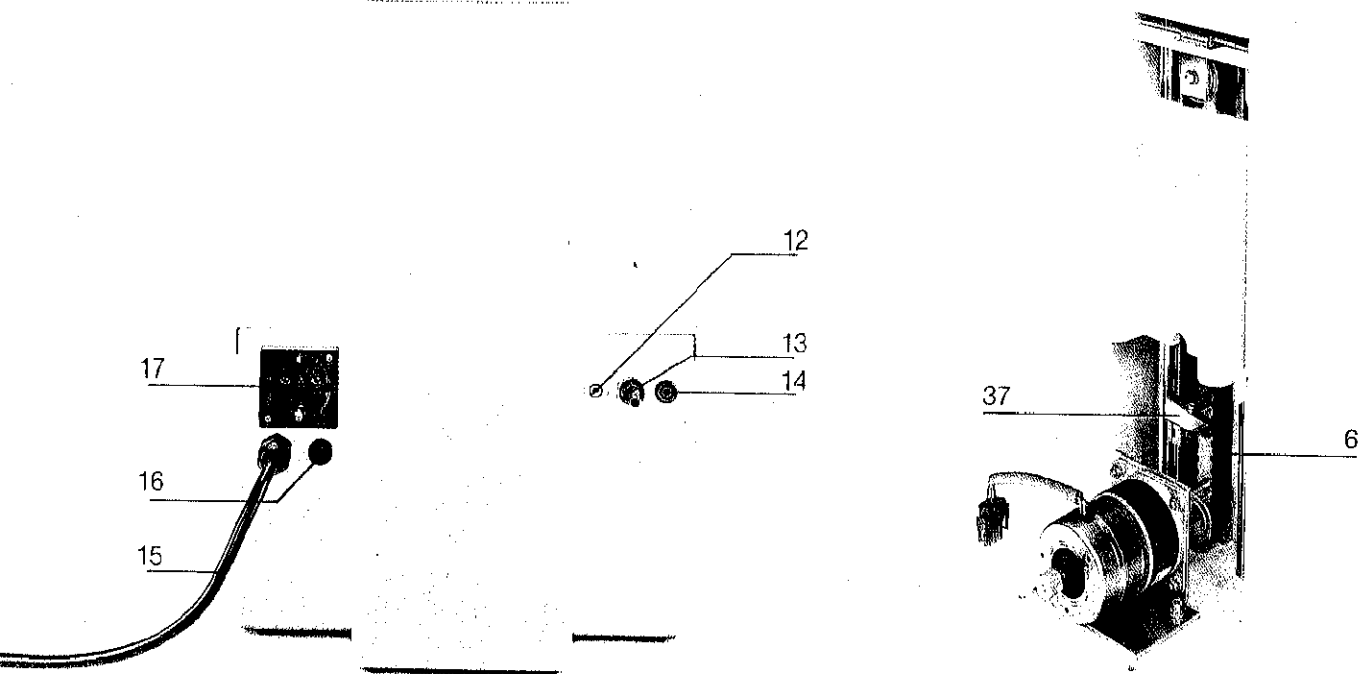
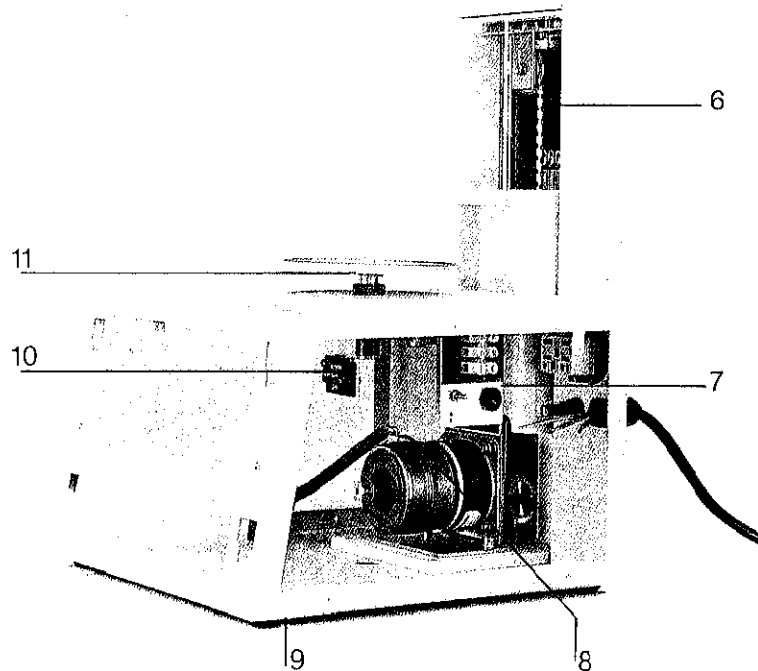
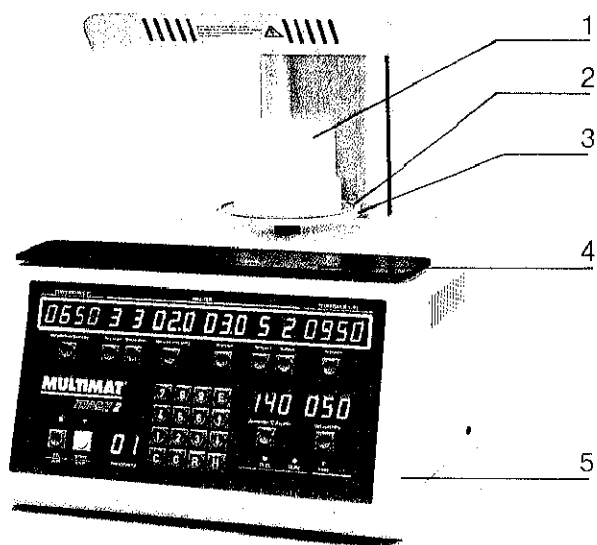
**Fitting:**

1. When fitting, precisely align new insulation insert; the recesses for the firing muffle must be located precisely in that position where the connection bolt bores are located in the aluminium boiler.
2. For assembly, Pyrostop bands between aluminium boiler and insulation insert will be required for locking in position when mounting or compensating, depending on the differences in tolerance.
3. Press insulation insert down until it has reached its stop position.
4. Fit all parts and components in reverse order.

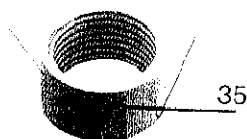
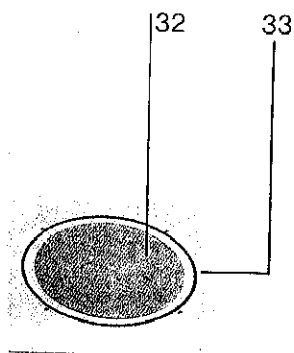
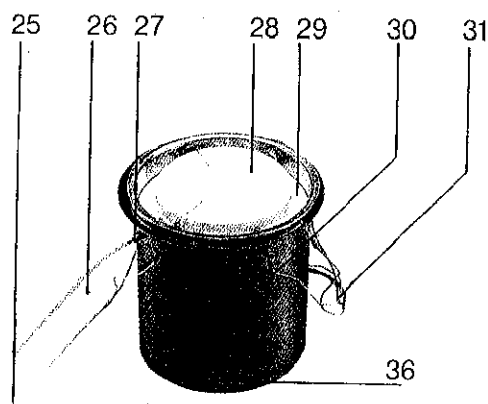
## Faults and corrective measures

Fault	Cause	Corrective measure
Fuse 315 mA blows (220 V). Fuse 800 mA blows (110-115 V).	Control system or solenoid valves.	Replace control system or solenoid valve.
No vacuum. Indication: „999“ hPa.	Vacuum pump is running, no vacuum is generated.	Replace solenoid valves 2/2-way.
No LED and display indication.	FI switch has triggered.	Reset and activate FI-switch.
Furnace does not produce any vacuum.	a) Dirt on the O-ring of the lift plate b) Most recent VA pump oil change goes back more than 3 months. c) Silicon seals or silicon hoses are porous. d) Hose connection piece on the valve leaks.	a) Clean O-ring. b) Change oil. c) Replace silicon seal or hoses. d) Re-seal hose connection piece on the solenoid valve.
Furnace does not heat up.	a) Firing muffle is defective. Red LED „Muffle“ illuminates. b) Control system is defective. c) Silicon line is defective.	a) Replace firing muffle. b) Exchange control system. Replace silicon line.
Top section moves higher than normally expected.	The microswitch is not correctly operated, or „bounces“, that is, it does not switchover precisely.	Replace and adjust microswitch.
Top section is located approx. 3 cm above the lift plate, and does not move up or down.	Foreign particle or transportation securing device between the furnace top section and the furnace bottom section.	Remove foreign matter, lift up top section by hand and hold or support by means of some item. Press Up ↑ key. The lift motor starts up; with some delay the top section will continue to move upwards automatically. (If the top section is not kept manually in an upward direction, the .
4 horizontal lines indicate the following horizontal strokes.	Feed from control unit to firing unit.	Renew silicon line.
No permanent thermoelement LED.	a) thermoelement – short circuit.  b) thermoelement/compensation line – interruption.	a) Check thermoelement. Lines must not be in contact with each other. b) Replace thermoelement / compensation line.
No program change possible (program number).	One or several keys are sticking.	Check key set; if necessary, replace relevant key.
Error message – E 3 –.	The temperature within the firing chamber will be temporarily increased by more than 20° C.	This error is usually caused by major workpieces, if drying or preheating times have been incorrectly set (too short). (In the case of larger dentures, increase by 2-3 mins. approx.)
Display remains dark, cannot be adjusted.	Display tube is defective.	Replace complete control system.

Fault	Cause	Corrective measure
Temperature calibration not possible (MACH 1 + 2).	With older MACH 1+2 furnaces, temperatures cannot be changed. MACH 1 up to no. 412. MACH 2 up to no. 1189.	Replace old version EPROM with new version EPROM. <u>Note:</u> The EPROM is located on the control board inside the control system. How to remove and refit the control system is described in the instructions.
Furnace can be switched on and off by pressing various different keys.	ON-OFF key is sticking.	Enlarge film section of ON/OFF key.

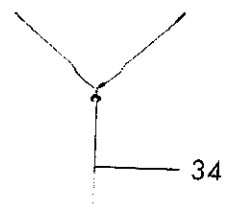
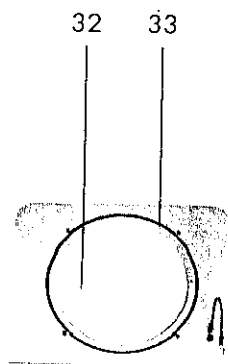
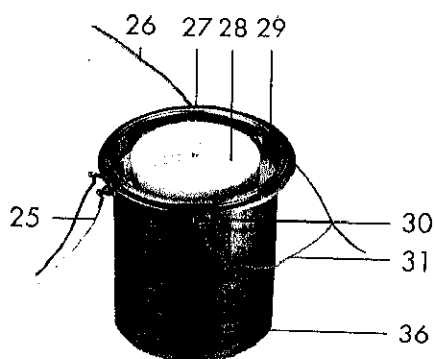
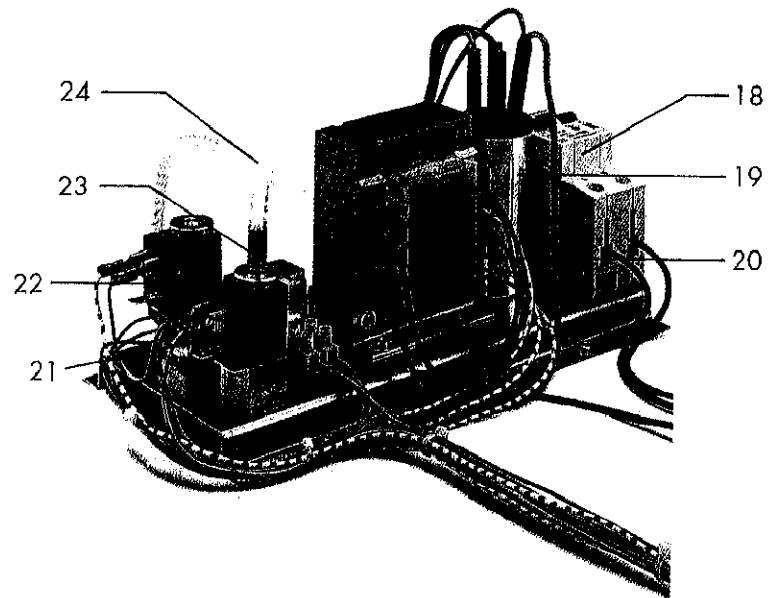
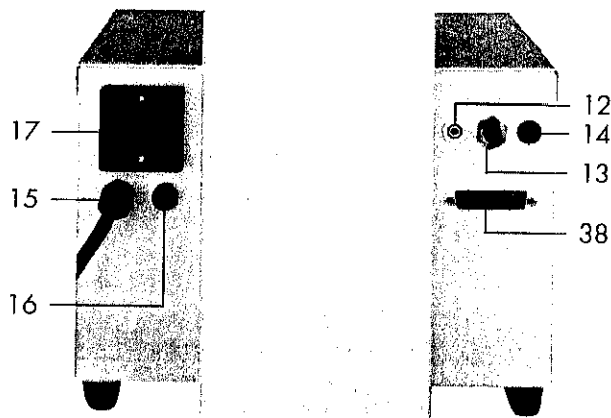
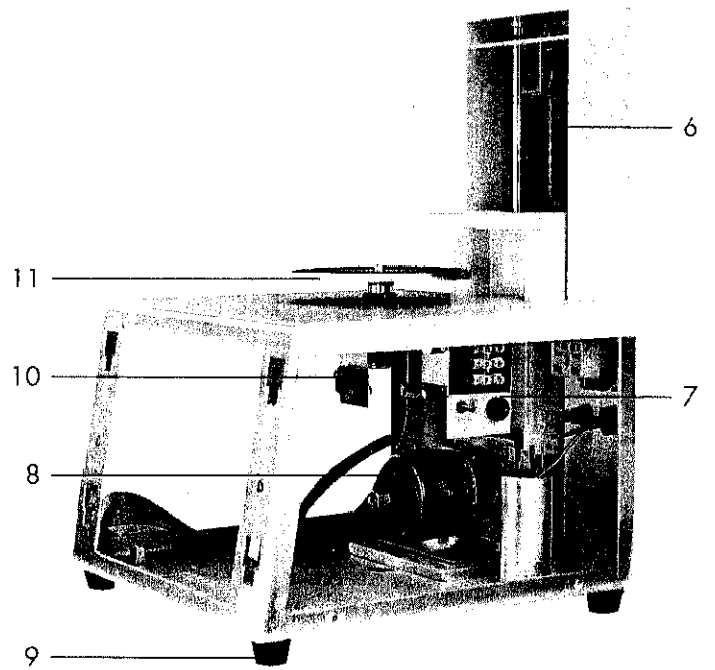
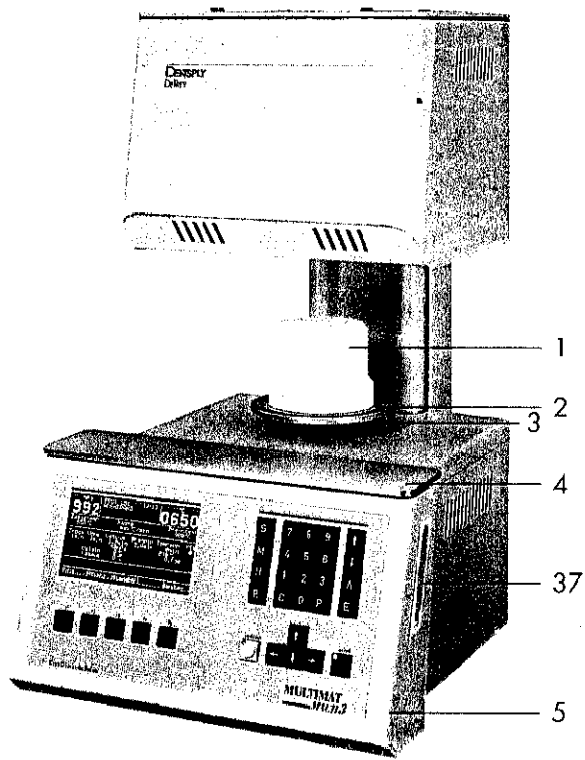






## Spare Parts List Mach 2

Pos.	Art.-Nr.	Description
1	03.532.159	Firing Platform
2	03.203.004	O-Ring For Lift Platform
3	03.400.224	Lift Platform With O-Ring
4	03.201.324	Heat Sink, Black Anodized
5	03.532.800-001	Microprocessor, German
	03.532.800-002	Microprocessor, English
	03.532.800-003	Microprocessor, French
6	03.243.901	Toothed Belt, 285 L
7	03.213.150.315 A	Fuse, 315 mA/250 V
	03.213.151	Fuse, 800 mA/100-115 V
8	03.532.310	Gear Motor
9	03.250.050	Rubber Foot, With Screwing
	03.250.052	Rubber Foot, Self-Adhesive
10	03.400.229.1215	Micro Switch
11	03.400.226.002	Lift Platform Seal
12	03.216.099.WS	Safety Lab Socket, White
13	03.246.016	Hose Connector - Metal
	03.246.013	Hose Connector - Plastic
14	03.216.099.ROT	Safety Lab Socket, Red
15	03.207.105	Power Line, 220 V
	03.207.032	Power Line, 100-115 V
16	03.213.100.10 A	Fuse, 10.0 A/250 V
	03.213.120.15 A	Fuse, 15 A/100-115 V
17	03.216.100	Build-in Receptacle
18	03.215.040	Mains Supply Failure Cut Out, 230 V
	03.215.041	Mains Supply Failure Cut Out, 100-115 V
19	03.205.F11126	Radio Interference Filter, F011126
20	03.217.EV3793	Transformer, EV 3793
	03.217.003	Transformer, EV 3793 A
21	03.501.802	3/2 Solenoid Valve
22	03.532.801	2/2 Solenoid Valve
23	03.532.805	Capacitor, Assembled, 26µF
24	03.246.031	Plastic Crossed Connector
25	03.532.806	Thermocouple Compensating Line
26	03.246.009	Silicone Hose p. Metre
	03.400.101.101	Spiral Spring p. Metre
27	03.400.239.131	Silicone Seal, 3 mm
28	03.222.326	Top Terminal Insulation*
	03.222.326.033	Top Terminal Insulation**
29	03.222.325.000	Insulation Insert
30	03.500.802	Terminal Stud, Complete
	03.400.236.131	Silicone Seal 5 mm, For Terminal Stud
31	03.532.302	Silicone Line, Complete
32	03.203.100	Barian Disc, 170 x 1 mm
	03.203.101	Barian Disc, 170 x 2 mm
33	03.203.060	O-Ring; 190.1 x 3.5
34	03.500.150.1	Thermocouple, Complete*
	03.533.370	Thermocouple, Complete**
35		<b>Heating Muffles</b>
	03.002.MC2.220 V	220/230 V - 1200/1300 W - 40 ohms
	03.002.MC2.115 V	115 V/1200 W
	03.002.MC2.240 V	240/230 V - 1200/1100 W - 48 ohms
36	03.222.331	Alu Vessel***
	03.222.332	Alu Vessel****
37	03.532.313	Shock Absorber For Toothed Belt
		* Mach 2 Furnaces up to Serial Number 2355
		** Mach 2 Furnaces from Serial Number 2356
		*** Mach 2 Furnaces up to Serial Number 2099
		**** Mach 2 Furnaces from Serial Number 2100



## Spare Parts List Mach 3

Pos.	Art.-Nr.	Description
1	03.532.159	Firing Platform
2	03.203.004	O-ring for Firing Platform Support
3	03.400.224	Firing Platform Support with O-ring
4	03.201.324.033	Heat Sink, silver anodized
5	03.533.800	Microprocessor Mach 3
6	03.243.901	Toothed Belt, 285 L
7	03.213.150.315 A	Fuse, 315 mA 250 V
	03.213.150.800 A	Fuse, 800 mA 100-110 V
8	03.532.310	Gear Motor
9	03.250.050	Rubber Foot
10	03.400.229.1215	Micro Switch
11	03.400.226.002	Firing Platform Support Seal
12	03.216.099.WS	Safety Lab Socket, White
13	03.246.013	Hose Connector, 1/8"
14	03.216.099.ROT	Safety Lab Socket, Red
15	03.207.105	Power Line, German
	03.207.033	Power Line, English
	03.207.032	Power Line, American
16	03.213.100.10 A	Fuse, 19201 10,0 A 250 V
	03.213.120.15 A	Fuse, 15 A, 120 V
17	03.216.100	Build in Receptacle, German
	03.216.032	Build in Receptacle, American
18	03.215.040	Ground Fault Interceptor, 230 V
	03.215.041	Ground Fault Interceptor, 110 V
19	03.205.F11126	Radio Interference Filter, F011126
20	03.217.EV3793	Transformer, EV 3793
21	03.501.802	3/2 Solenoid Valve
22	03.532.801	2/2 Solenoid Valve
23	03.532.805	Capacitor, assembled
24	03.246.031	Plastic Crossed Connector
25	03.532.806	Thermocouple Compensating Line
26	03.246.009	Silicone Hose p. metre
	03.400.101.101	Spiral Spring p. metre
27	03.400.239.131	Silicone Seal, 3 mm
28	03.222.326.033	Top Terminal Insulation
29	03.222.325	Insulation Insert
30	03.500.802	Terminal Stud, complete
	03.400.236.131	Silicone Seal for Terminal Stud
31	03.532.302	Silicone Line, complete
32	03.203.023	Insulation disc, 170 x 2
33	03.203.060	O-ring, 190, 1 x 3,5
34	03.533.370	Thermocouple, complete
35	03.002.MC2.220 V	Heating Muffle 230 V 1300 W
	03.002.MC2.100 V	Heating Muffle 100 V 1200 W
	03.002.MC2.115 V	Heating Muffle 115 V 1200 W
36	03.222.333	Alu Vessel
37	03.206.333	Memory Card 256
38	03.207.333	Ribbon Cable with Multiple Connector
39	03.533.802	Calibration Platform
40	03.260.049 o. Abb.	Vacuum Pump Hose complete
41	03.532.313 o. Abb.	Shock Absorber for Toothed Belt