3M ESPE

Pentamix™2

Reparaturhandbuch
Service Manual

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Vers. (11/02)

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Table of Contents

Vers. (11/02)

Vers. (11/02)

Table of Illustrations

Vers. (11/02)

1 Safety Instructions

The service manual contains basic instructions which must be complied with when repair work is being carried out. Accordingly, the service engineer must not fail to read this service manual before carrying out any repair work. It must be accessible at all times at the place where the machine is being operated. Moreover not only the general safety instructions listed in the section dealing with safety should be observed but also special safety instructions included in the other main sections.

1.1 Marking of Instructions in the Service Manual

Those safety instructions included in this service manual which could lead to endangerment of persons if ignored are marked with the general danger symbol

safety symbol as per DIN 4844 - W9,
where a warning is given concerning electrical power then

the safety symbol as per DIN 4844 - W8 is used.

In the case of safety instructions where non-compliance could endanger the machine and its functions, the word

CAUTION

has been added.

Information affixed directly to the machine, such as

- markings showing direction of rotation
- markings for electrical and mechanical connections

must never be ignored and must always be kept completely legible.

1.2 Personnel Qualifications and Training

Personnel carrying out repair work on this equipment must possess the corresponding qualifications for this work. The owner must lay down precise rules regarding the area of responsibility, the duties and the supervision of the personnel.
If the personnel are not in possession of the necessary skills then they should be trained and instructed in these. If necessary this can be done by the manufacturer or supplier at the owner's request. In addition the owner must ensure that his personnel fully understand the contents of the service manual.

1.3 Danger when Safety Instructions are not Observed

Failure to observe the safety instructions may lead to both endangerment of persons as also of the environment and the machine. If you do not comply with safety instructions this can result in the loss of any claims for losses.

In particular non-observance of safety instructions may bring with it the following potential hazards:

- failure of major machine functions
- failure of the methods prescribed for maintenance and repair
- endangerment of persons by electrical, mechanical and thermal effects.

1.4 Safety - Conscious Working

The safety instructions drawn up in this service manual, existing national regulations concerning accident prevention, and any internal work, operational and safety regulations of the owner must all be observed.

1.5 Safety Instructions for the Service Engineer

Potential endangerment from electrical power must be excluded (for details see for example VDE regulations and those of the local power supply authority).

1.6 Safety Instructions for Repair Work

The owner must ensure that all repair work is carried out by authorised and qualified technicians who have acquainted themselves in depth with the service manual.

Work on the equipment will only be carried out when it has been shut down.

Immediately after repair work is finished all safety and guard facilities must be replaced or reactivated.

Vers. (11/02)

1.7 Unauthorised Modifications and Manufacture of Spare Parts

Conversion or modification of the machine is only permitted with the approval of the manufacturer. The use of original spare parts and accessories authorised by the manufacturer is in the interests of safety. Use of other parts may cancel manufacturers liability for the ensuing consequences.

2 Contacts and Address for Service Department

Region:
Europe, Nothern Africa, Near East

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Vers. (11/02)

3 Before Starting Service

3.1 Tools Required

Allen key
Open-ended spanner
Pointed pliers
Rubber hammer
Screwdriver for recessed-head screws
Screwdriver for slotted-head screws 2x
Side nippers
Universal pliers

3.2 Other Equipment Required

Balance
Felt pen
Multimeter
Slide gauge
Soldering iron
Stopwatch

Vers. (11/02)

4 General Description

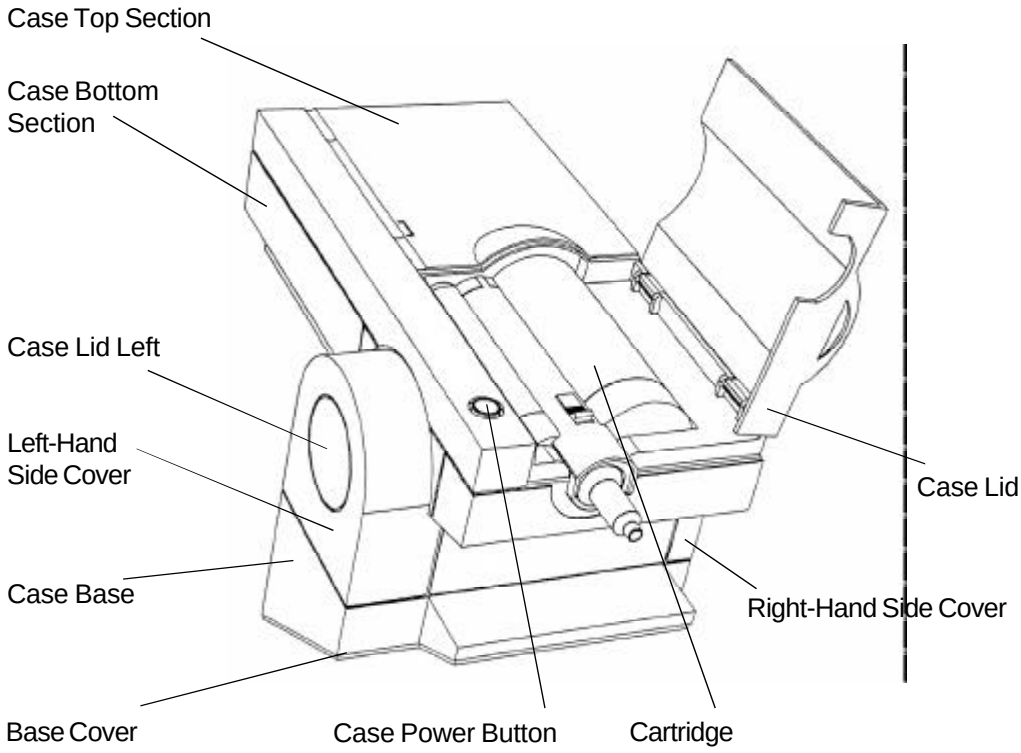


Fig. 1 PENTAMIX 2

4.1 Description of the Product

CAUTION
The power supply for the PENTAMIX 2 is 230V~ (US: 120V~). This means that parts of the unit carry hazardous voltages! Make sure you always remove the mains plug before performing repairs.

The applicable accident prevention regulations, VDE regulations and operating instructions for the PENTAMIX 2 should be observed.
Make sure you always follow the repair procedure in its proper order to prevent any injury.

Before starting up the unit for the first time, check that the operating voltage and frequency indicated on the rating plate correspond to the supply voltage and frequency available.

Do not lock the start button of the PENTAMIX 2 to avoid hazardous situations and non-stop operation.

The PENTAMIX 2 is an automatic dispensing and mixing unit for ESPE PENTA impression materials. The PENTA impression materials designed for use with this unit are supplied in polythene bags. Only this type of packaging can be used with the PENTAMIX 2.

The polythene bags are inserted in the unit using sturdy, product-specific marked cartridges. They permit product changeover and refilling without any wastage or need for intermediate cleaning.

The unit is suitable for either tabletop use or wall mounting.
See the operating instructions for the PENTAMIX 2 for how to fill, insert and start up a cartridge.

Vers. (11/02)

4.2 Troubleshooting

CAUTION
Before starting up the PENTAMIX 2 for the first time, check that the operating voltage and frequency indicated on the rating plate correspond to the supply voltage and frequency available.

❍ Visual check for defects
Before locating faults check the PENTAMIX 2 for mechanical damage.

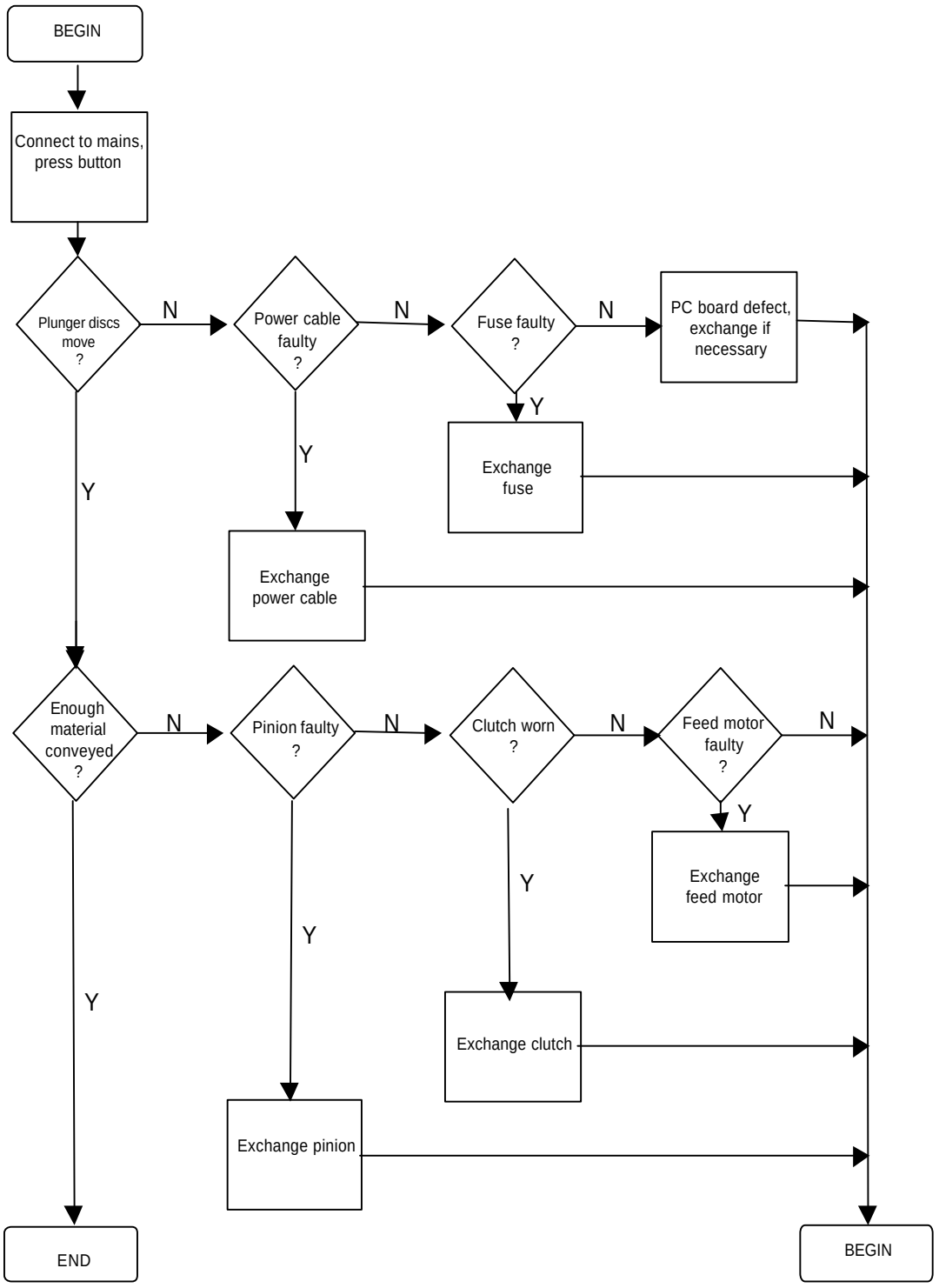
Connect the PENTAMIX 2 to the power supply using the power cable and make a functional check.

❍ Locate faults according to the following fault location diagram

CAUTION
When measurements are taken with the PENTAMIX 2 open, the power switch, feed motor, mixer motor, PC board and power transformer are subject to hazardous voltages.

Vers. (11/02)

Fault location diagram



5 Pentamix™ 2

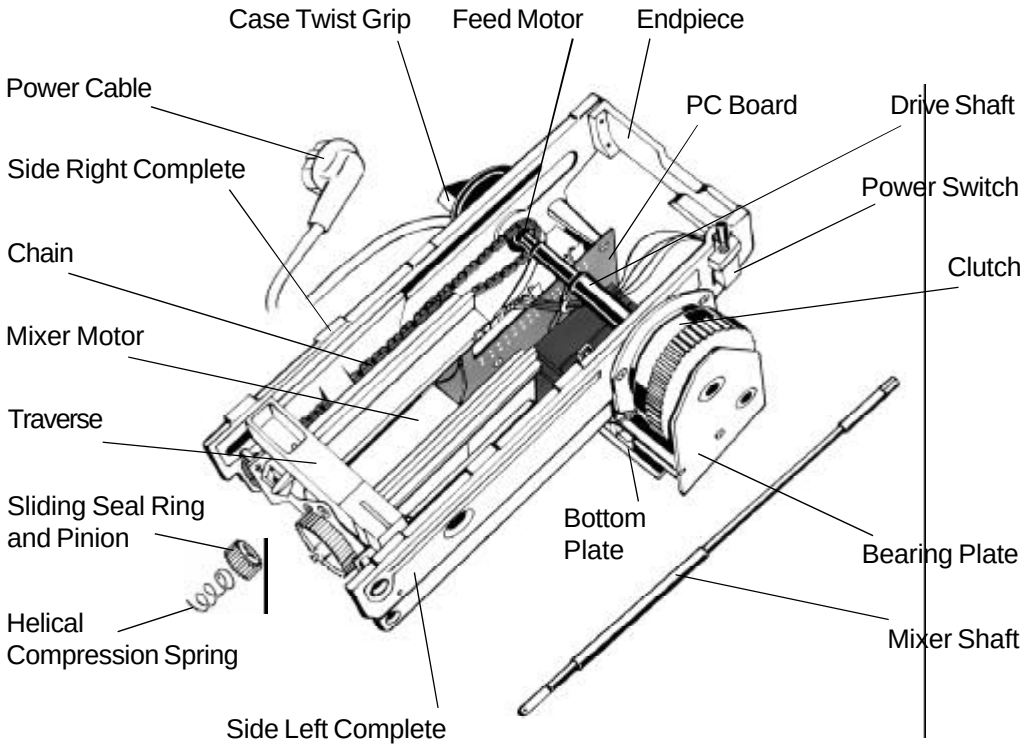


Fig. 2 Open PENTAMIX 2

5.1 Case Lid

Changing case lid

1. Open case lid and grasp with both hands
2. Remove case lid sideways
3. Snap new case lid into place by pressing onto both hinges

Vers. (11/02)

5.2 Plunger Discs

Changing plunger discs

1. Remove plunger disc screws
2. Remove plunger discs from traverse
3. Fit new plunger discs as shown in Fig. 3

NOTE
When replacing plunger discs make sure that the smooth side of the plunger discs is facing the polythene bag (the reverse with the fan-shaped recesses must face away). Otherwise the polythene bag may become damaged.
Fit support discs as shown in Fig. 3.

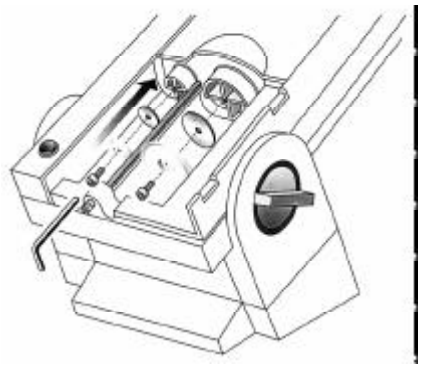


Fig. 3 Plunger Discs

5.3 Base

Changing base

1. Place unit upside down on a clean non-slip surface
2. Remove recessed-head screws of base cover
3. Remove base cover
4. Unwind power cable from reel
5. Remove recessed-head screws holding case base
6. Remove case base
7. Fit new case base, proceeding in reverse order

NOTE
Put the screws into numbered dishes or attach to the individual parts using adhesive tape. This will help you to reassemble the PENTAMIX 2 later on.

Vers. (11/02)

5.4 Left and Right Hand Side Covers

CAUTION
Before opening the PENTAMIX 2 make sure you remove the mains plug.

Changing left-hand side cover

1. Remove case base - see section 5.3
2. Carefully remove case lid left using a screwdriver for slotted-head screws
3. Remove recessed and countersunk head screw of left-hand side cover
4. Slightly raise left-hand side cover and remove sideways
5. Fit new left-hand side cover, proceeding in reverse order

Changing right-hand side cover

1. Remove base - see section 5.3
2. Carefully remove case twist grip using two screwdrivers for slotted-head screws

NOTE
The spring plate inserted in the twist grip has to be fitted with the curved side facing the drive shaft to ensure secure locking.

3. Remove recessed and countersunk head screw of right-hand side cover
4. Slightly raise right-hand side cover and remove sideways
5. Fit new right-hand side cover, proceeding in reverse order

NOTE
Before assembling, pass the power cable through the strain relief device provided.

5.5 Case Bottom Section

Changing case bottom section

1. Remove case base - see section 5.3
2. Remove both side covers - see section 5.4
3. Remove both recessed-head screws for fixing to bottom plate
4. Remove eight recessed-head screws for fixing to case top section
5. Lift off case bottom section
6. Install new case bottom section in reverse order
7. Assembling housing - see section 5.20
8. Functional test - see section 6

Vers. (11/02)

5.6 Mixer Shaft

Changing mixer shaft

1. Remove case base - see section 5.3
2. Remove both side covers - see section 5.4
3. Remove case bottom section - see section 5.5
4. Remove helical compression spring at back
5. Remove shaft securing of mixer shaft
6. Hold pinion

> NOTE
> There is a sliding seal ring between the pinion and helical compression spring

7. Pull mixer shaft towards front of unit to remove from case
8. Fit new mixer shaft in reverse order
9. Assembling housing - see section 5.20
10. Functional test - see section 6

5.7 Case Top Section

Changing case top section

1. Remove plunger discs - see section 5.2
2. Remove case base - see section 5.3
3. Remove both side covers - see section 5.4
4. Remove case bottom section - see section 5.5
5. Remove mixer shaft - see section 5.6
6. Push traverse right back using twist grip
7. Remove case top section
8. Fit new case top section in reverse order
9. Assembling housing - see section 5.20
10. Functional test - see section 6

Vers. (11/02)

5.8 Power Switch

Changing power switch

1. Remove plunger discs - see section 5.2
2. Remove case base - see section 5.3
3. Remove both side covers - see section 5.4
4. Remove case bottom section - see section 5.5
5. Remove mixer shaft - see section 5.6
6. Remove case top section - see section 5.7
7. Remove power switch from its mounting
8. Mark leads of power switch and unsolder

CAUTION
The snap lock must be removed from the new power switch:
Push the bottom of the helical compression spring back until the snap lock can be removed.

CAUTION
Before installing the new power switch the soldering tags should be cut off without making a hole flush with the rear of the power switch using side nippers.

9. Install new power switch in reverse order
10. Assembling housing - see section 5.20
11. Functional test - see section 6

5.9 Power Cable

Changing power cable

1. Remove plunger discs - see section 5.2
2. Remove base - see section 5.3
3. Remove both side covers - see section 5.4
4. Remove case bottom section - see section 5.5
5. Remove clamping screws of power cable on PC board
6. Remove power cable
7. Fit new power cable in reverse order

CAUTION
Recheck that wiring is correct, in particular the yellow & green protective conductor (US: green).

8. Assembling housing - see section 5.20
9. Functional test - see section 6

Vers. (11/02)

5.10 Clutch

Changing clutch

1. Remove plunger discs - see section 5.2
2. Remove case base - see section 5.3
3. Remove both side covers - see section 5.4
4. Remove case bottom section - see section 5.5
5. Remove mixer shaft - see section 5.6
6. Remove case top section - see section 5.7
7. Remove recessed-head screw of bearing plate
8. Lift off bearing plate using two screwdrivers
9. Lift off spur wheel and support ring
10. Release connection wires from terminal strip of PC board
11. Remove recessed-head screws of spool
12. Lift off spool

CAUTION
Pay attention to the slide bearing between the spur wheel and drive shaft

13. Install new clutch in reverse order
14. Assembling housing - see section 5.20
15. Functional test - see section 6

5.11 Side Left

Changing side left

1. Remove plunger discs - see section 5.2
2. Remove case base - see section 5.3
3. Remove both side covers - see section 5.4
4. Remove case bottom section - see section 5.5
5. Remove mixer shaft - see section 5.6
6. Remove case top section - see section 5.7
7. Remove clutch - see section 5.10
8. Remove recessed-head screw connecting endpiece
9. Remove connection to bearing plate for mixer motor
10. Remove Allen screws connecting bottom plate on left-hand side
11. Remove left side complete using rubber hammer
12. Remove geared motor
13. Lift off chain and deflection roller
14. Install new side in reverse order
15. Check cut-off point - see section 5.19
16. Assembling housing - see section 5.20
17. Functional test - see section 6

Vers. (11/02)

5.12 Traverse

Changing traverse

1. Remove plunger discs - see section 5.2
2. Remove case base - see section 5.3
3. Remove both side covers - see section 5.4
4. Remove case bottom section - see section 5.5
5. Remove mixer shaft - see section 5.6
6. Remove case top section - see section 5.7
7. Slide forward both traverse covers to remove
8. Move cross-member to reveal the recessed-head screws fixing the chains to the traverse in the bore
9. Remove recessed-head screws
10. Loosen left side - see section 5.11

> NOTE
> Left side should only be loosened and not removed completely

11. Remove traverse
12. Fit new traverse in reverse order
13. Check shut-off point - see section 5.19
14. Assembling housing - see section 5.20
15. Functional test - see section 6

5.13 Drive Shaft

Changing drive shaft

1. Remove plunger discs - see section 5.2
2. Remove case base - see section 5.3
3. Remove both side covers - see section 5.4
4. Remove case bottom section - see section 5.5
5. Remove mixer shaft - see section 5.6
6. Remove case top section - see section 5.7
7. Move traverse to reveal the recessed-head screws fixing the chains to the traverse in the bore
8. Remove recessed-head screws
9. Remove left side - see section 5.11
10. Remove cable ties
11. Release feed motor leads from terminal strip of PC board
12. Release connection to bearing plate for mixer motor
13. Remove deflection roller with chain
14. Remove drive shaft
15. Install new drive shaft in reverse order
16. Check shut-off point - see section 5.19
17. Assembling housing - see section 5.20
18. Functional test - see section 6

Vers. (11/02)

5.14 Chains

> NOTE
> It is recommended that the chains are only replaced in pairs as both chains have been mechanically adjusted as a pair by the factory. This firstly ensures that the traverse does not tilt when moved and secondly, prevents excessive wear to the feed motor gears.

Changing chains

1. Remove plunger discs - see section 5.2
2. Remove case base - see section 5.3
3. Remove both side covers - see section 5.4
4. Remove case bottom section - see section 5.5
5. Remove mixer shaft - see section 5.6
6. Remove case top section - see section 5.7
7. Remove clutch - see section 5.10
8. Move traverse to reveal the recessed-head screws fixing the chains to traverse in the bore
9. Remove traverse screws fixing cross-member to chain
10. Remove left side - see section 5.11
11. Remove drive shaft - see section 5.13
12. Remove connection to bearing plate for mixer motor
13. Remove both chains
14. Install new chains in reverse order

> NOTE
> When installing the two chains always check for identical number of links.

15. Check shut-off point - see section 5.19
16. Assembling housing - see section 5.20
17. Functional test - see section 6

Vers. (11/02)

5.15 Feed Motor

Changing feed motor

1. Remove plunger discs - see section 5.2
2. Remove case base - see section 5.3
3. Remove both side covers - see section 5.4
4. Remove case bottom section - see section 5.5
5. Remove mixer shaft - see section 5.6
6. Remove case top section - see section 5.7
7. Remove clutch - see section 5.10
8. Remove Allen screws from bottom plate
9. Disconnect connection wires of feed motor from PC board
10. Remove recessed-head screws of motor block

> NOTE
> Hold motor block firmly

11. Turn motor block through 180° anti-clockwise
12. Tip motor block
13. Carefully pull out motor shaft downwards
14. Install new feed motor in reverse order
15. Assembling housing - see section 5.20
16. Functional test - see section 6

5.16 Mixer Motor

Changing mixer motor

1. Remove plunger discs - see section 5.2
2. Remove case base - see section 5.3
3. Remove both side covers - see section 5.4
4. Remove case bottom section - see section 5.5
5. Remove mixer shaft - see section 5.6
6. Remove case top section - see section 5.7
7. Release connection wires of mixer motor from PC board
8. Remove connection to bearing plate for mixer motor
9. Remove mixer motor
10. Install new mixer motor in reverse order
11. Assembling housing - see section 5.20
12. Functional test - see section 6

Vers. (11/02)

5.17 PC-Board

Changing PC-board

1. Remove plunger discs - see section 5.2
2. Remove case base - see section 5.3
3. Remove both side covers - see section 5.4
4. Remove case bottom section - see section 5.5
5. Remove mixer shaft - see section 5.6
6. Remove case top section - see section 5.7
7. Remove feed motor - see section 5.16
8. Release all PC-board connection wires
9. Remove recessed-head screws for fixing PC-board
10. Remove PC-board

NOTE
PC-board connections are marked accordingly.
Also see section 7.1 Circuit Diagram

11. Install new PC-board in reverse order
12. Check shut-off point - see section 5.19
13. Assembling - see section 5.20
14. Functional test - see section 6

CAUTION
Check for correct wiring
Secure cables again using cable ties

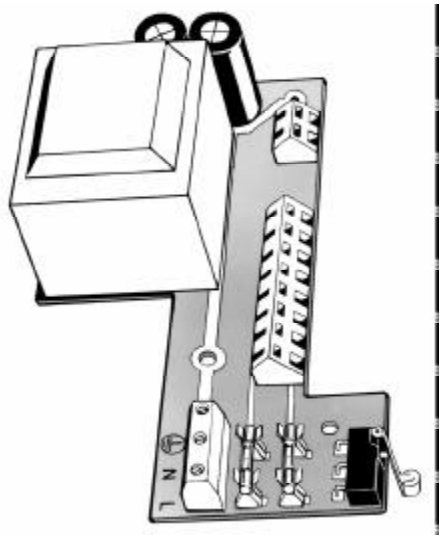


Fig. 4 PC-board

Vers. (11/02)

5.18 Side Right

Changing side right

1. Remove plunger discs - see section 5.2
2. Remove case base - see section 5.3
3. Remove both sides - see section 5.4
4. Remove case bottom section - see section 5.5
5. Remove mixer shaft - see section 5.6
6. Remove case top section - see section 5.7
7. Disconnect power cable from PC board and remove
8. Remove Allen screws connecting bottom plate on right-hand side
9. Remove recessed-head screw connecting endpiece
10. Remove connection to bearing plate for mixer motor
11. Slightly lift right side
12. Remove deflection roller and chain
13. Lift off right side
14. Remove screws for fixing PC-board
15. Install new right side in reverse order
16. Check shut-off point - see section 5.19
17. Assembling housing - see section 5.20
18. Functional test - see section 6

5.19 Shut-Off Point

Instructions for adjusting shut-off point

1. Remove plunger discs - see section 5.2
2. Remove base - see section 5.3
3. Remove both side covers - see section 5.4
4. Remove case bottom section - see section 5.5
5. Remove mixer shaft - see section 5.6
6. Remove case top section - see section 5.7
7. Loosen recessed-head screw at rider
8. Push traverse towards endpiece until the distance between the traverse and endpiece measures 29,5 ± 0.5 mm
9. Slide the rider until a click is heard
10. Tighten recessed-head screw
11. Recheck switching point by listening for click when traverse is moved and distance of 29,5 ± 0.5 mm is reached
12. Assembling housing - see section 5.20
13. Functional test - see section 6

Vers. (11/02)

5.20 Assembling Housing

CAUTION
Before assembling the PENTAMIX 2 make sure that all power connections have been properly soldered and clamped.

Also check that the PC board connections, in particular the yellow & green protective conductor (US: green), are securely fixed to the terminal strip.

Check for correct wiring

NOTE
Make sure that the traverse runs smoothly and without play in the guide.

Assembling Housing

1. Fit power switch
2. Fit case power button
3. Fit case top section
4. Insert mixer shaft into unit from front
5. Fit pinion with sliding seal ring
6. Secure shaft
7. Insert helical compression spring

NOTE
Insert bent end of helical compression spring towards case top section

8. Place unit on case top section
9. Fit case bottom section

10. Attach case bottom section to bottom plate using both recessed-head screws
11. Insert remaining recessed-head screws
12. Insert left-hand side cover and push down
13. Insert recessed and countersunk head screws
14. Insert right-hand side cover and push down
15. Insert recessed and countersunk head screws

NOTE
Before assembling, pass the power cable through the strain relief device provided.

16. Pass power cable through case base
17. Fit case base
18. Fix case base using recessed-head screws
19. Wind power cable in a clockwise direction 1½ turns onto reel
20. Place power cable in cable guide
21. Fit base cover and fix using recessed-head screws
22. Snap case lid into place
23. Fit twist grip and spring plate possibly using a rubber hammer
24. Install plunger discs

NOTE
Do not fit case lid on left until final test has been carried out

Vers. (11/02)

6 Functional Test

Before assembling the case parts check the cut-off point to avoid unnecessary wear to the clutch. Also check the wiring.

A final check should be carried out on the unit according to the respective test specifications whenever repairs have been performed.

CAUTION
The applicable regulations must be observed when working on electrical equipment.

Functional test

❍ Traverse
Move the traverse by hand over the entire function range using the twist grip. Make sure that the traverse runs smoothly and without play in the guides

Move the traverse into the starting position

The hexagonal part of the mixer shaft should retract into the slide bearing and return to the operating position smoothly as soon as the twist grip is moved forward

❍ Plunger discs
Insert empty cartridges into the unit

Insert plunger discs into the cartridge by operating the twist grip

The plunger discs should be automatically centred in the cartridge and slide easily towards the bottom when the twist grip is turned

❍ Dispensing behaviour
Insert full cartridge in unit and start up

NOTE
Measurements are taken over 60 seconds during which the current mass flow is fed to balance.

Feed rate: 90 - 95 g/min Impregum
140 - 145 g/min Dimension Penta H should be observed

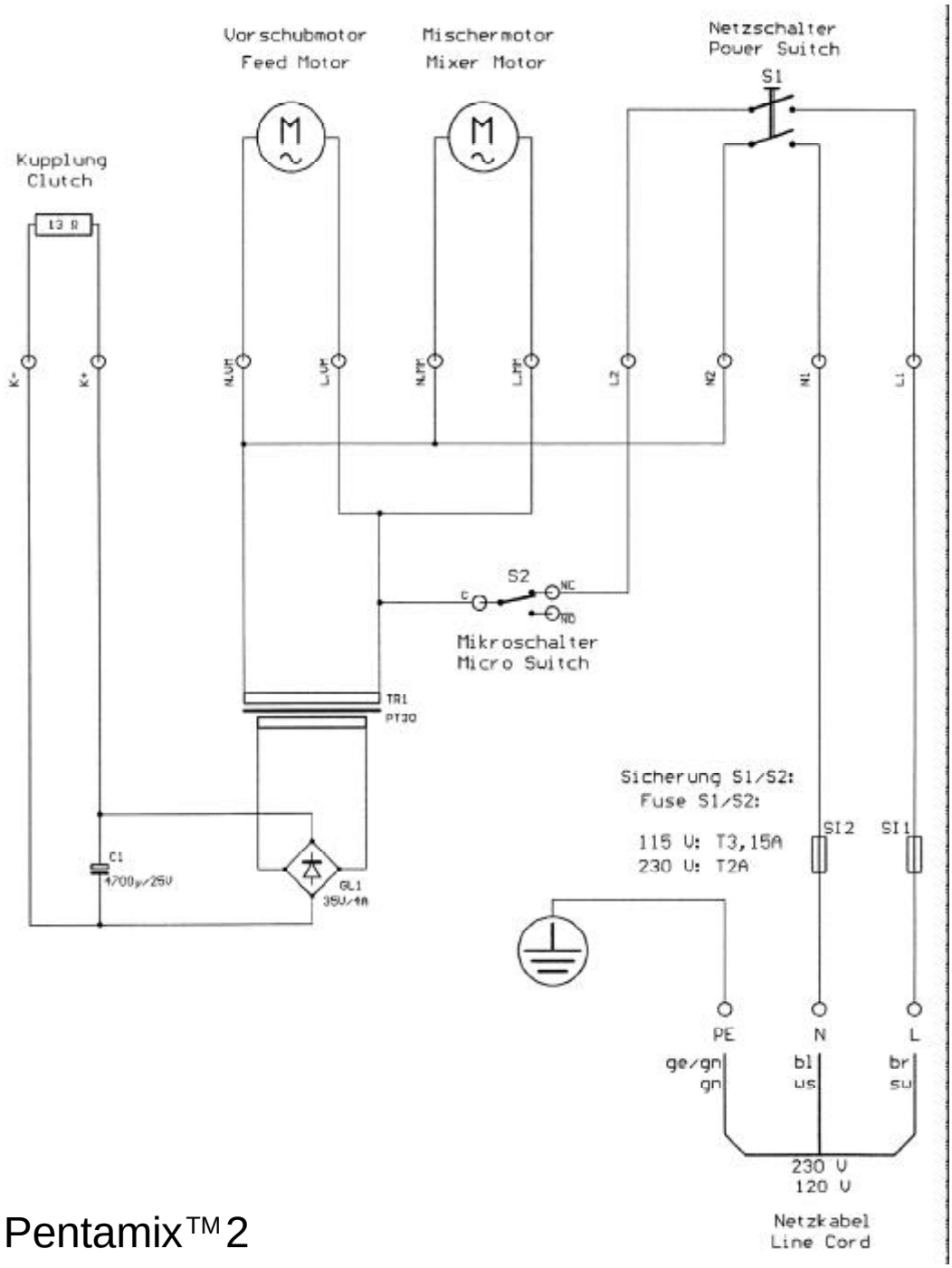
A stopwatch and balance are required to measure the feed rate

❍ Protective conductor test
Check bearing plate (remove side cover on left) against protective conductor contact

Vers. (11/02)

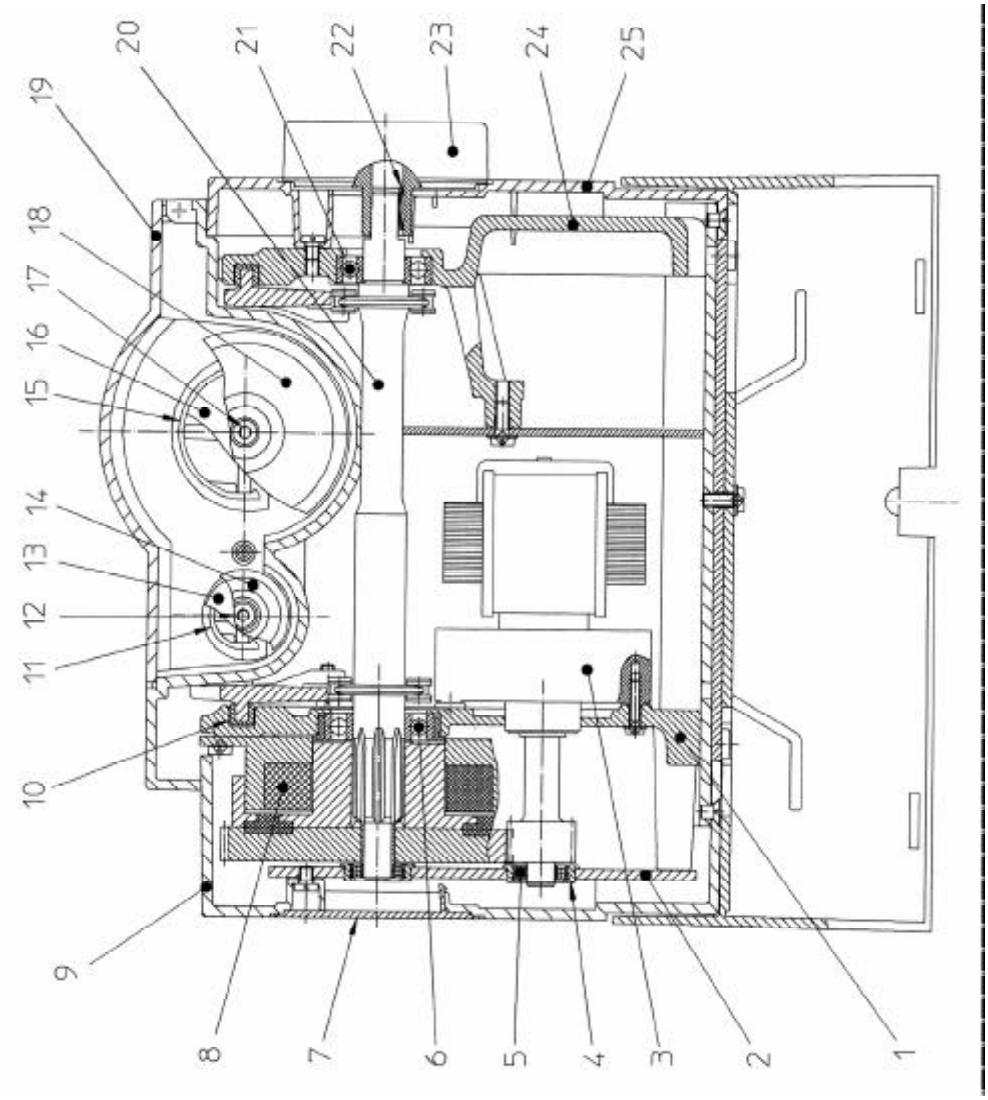
7 Circuit Diagram / Drawings / Spare Parts List

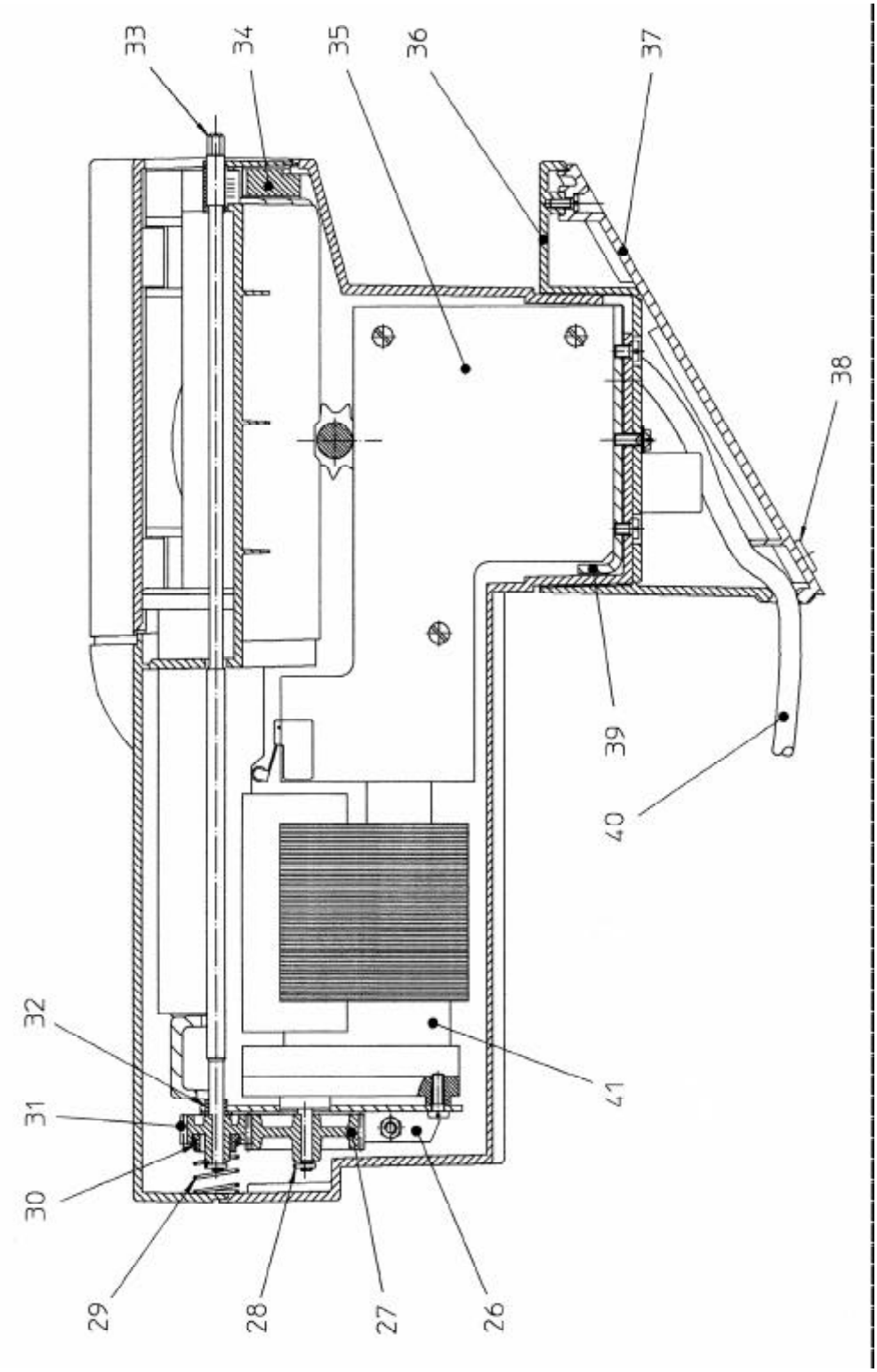
7.1 Circuit Diagram



Pentamix™2

7.2 Drawings

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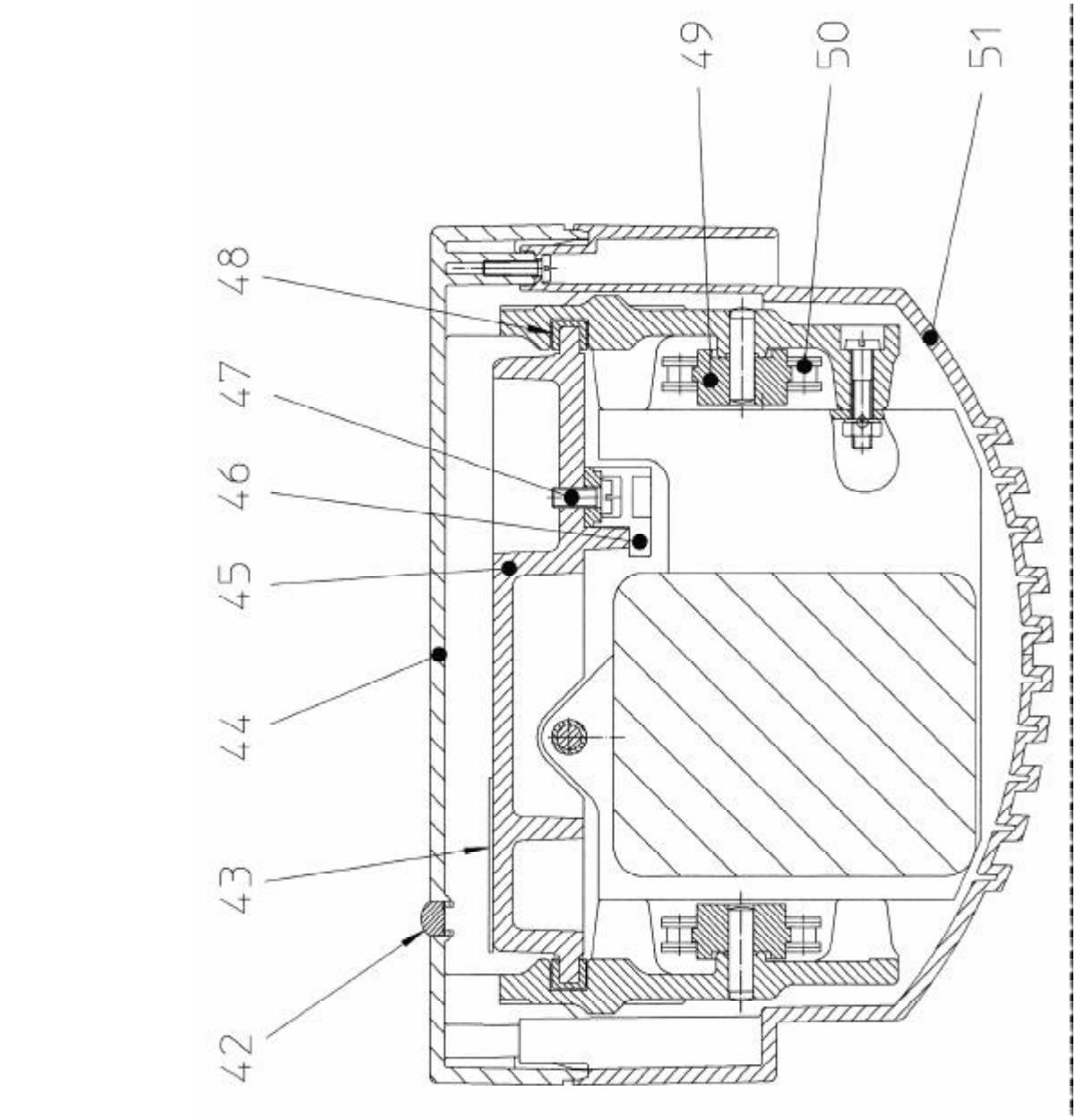
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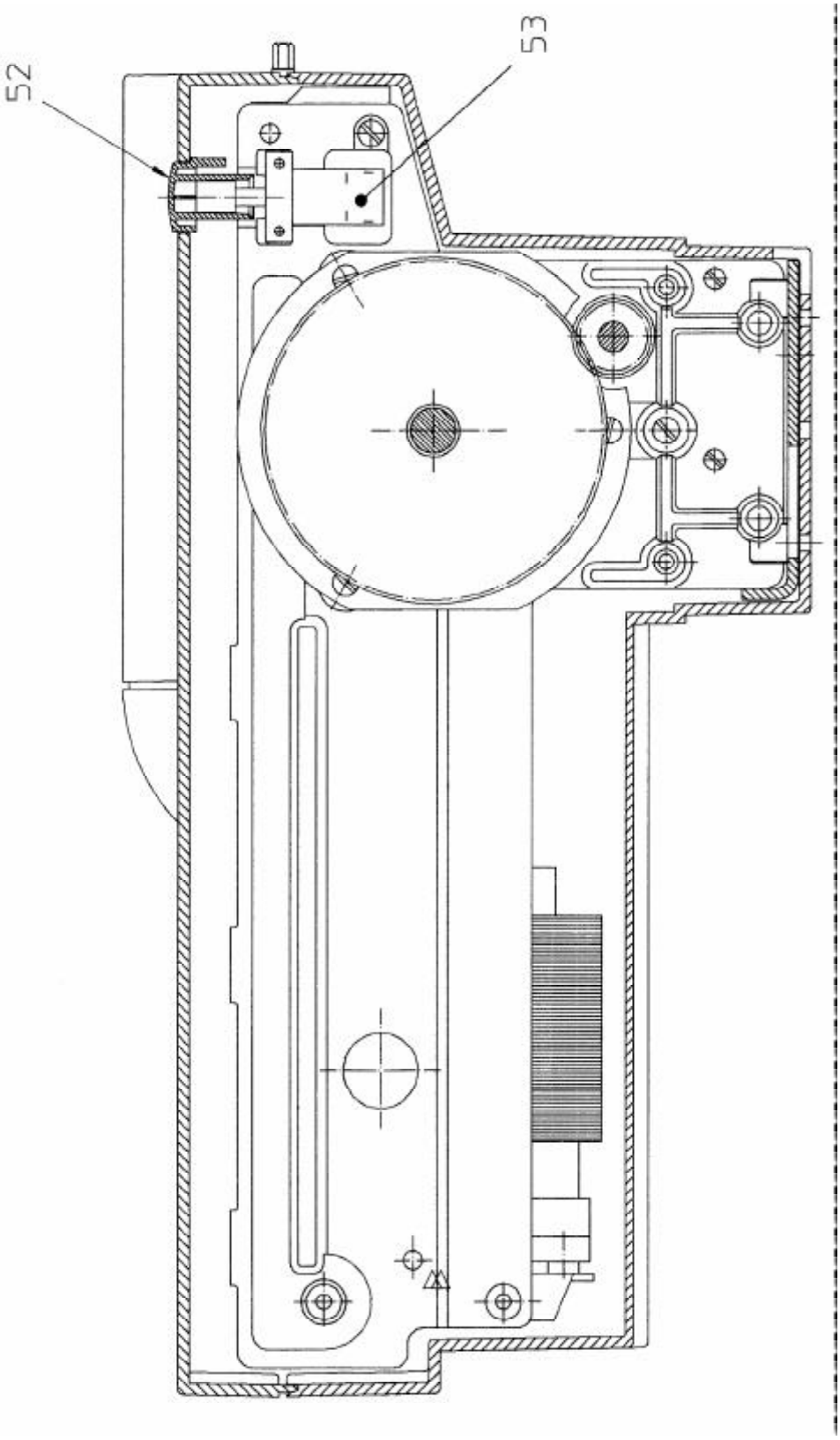
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7.3 Spare Parts list

Item	Part Number	Description ..... pcs/Package
--	77600	Wal Mounting Kit Pentamix 1
18	77780	Plunger Discs 1
22,23	70201112722	Twist Grip Pentamix Mountage Kit 1
--	78990240208	Fuse 220/240 V/2 AMP (10pcs) 10
38	78990241222	Rubber Foot (RD) 12,7x3,5 10
--	78990241404	Microswitch Penta 2 1
40	78990241420	Power Cord 3POL USA/25H WS 1
--	78990241438	Parallel Key A4x4x22 1
43-48	78990241503	Traverse comolete (Mounted) 1
2,4,5	78990241537	Bearing Plate Mounted Penta 2 1
39	78990241545	Bottom Plate Penta 2 1
33	78990241578	Mixer Shaft complete Penta 2 1
51	78990241594	Case Bottom Section Penta 2 1
9	78990241602	Left Hand Side Cover Penta 2 1
25	78990241610	Right Hand Side Cover Penta 2 1
19	78990241628	Case Lid Penta 2 1
36	78990241636	Base Penta 2 1
7	78990241644	Case Lid of left Side Cover Penta 2 1
37	78990241677	Base Cover Penta 2 1
11	78990241685	Large Traverse Cover 36mm Penta 2 1
15	78990241693	Small Traverse Cover 20mm Penta 2 1
20	78990241826	Drive Shaft Penta 2 1
49	78990241834	Deflection Roller Penta IMP/2 1
50	78990241842	Chain complete Penta 2 1
34	78990241859	Endpiece Penta 2 1
29	78990241867	Helicoil Compression Spring P2 1
31	78990241875	Pinion Penta 2 1
30	78990241883	Sliding Seal Rings Penta 2 10
52	78990241891	Case Power Button Penta 2 1
42,44	78990241909	Case Top complete Penta 2 1
3	78990241941	Feed Motor Penta 2 1
26-41	78990241958	Mixer Motor Penta 2 1
35	78990242402	PC Board 120V Penta 2 1
1,6,10	78990242410	Left Side complete Penta 2 1
10,21,24	78990242428	RIight Side complete Penta 2 1
40	78990242766	Power Cable - GB. 1
40	78990243004	Power Cable AUS 1
53	78990243111	Power Switch Complete 1
35	78990243228	PC Board 230 V Penta 2 1
40	78990243244	Power Cable CH 1
40	78990243251	Power Cable EU 1
3	78990243921	Feed Motor 230 V Penta 2 1
8	78990243939	Clutch Penta 2 1
26-41	78990243947	Mixer Motor 230 V Penta 2 1