

Nimbus 4 Systems

Service Manual

ARJOHUNTLEIGH
GETINGE GROUP



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Amendment Record

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CHAPTER 1

INTRODUCTION

1 About This Manual

ArjoHuntleigh strongly recommend that their equipment is only serviced by trained personnel and provide courses for customers who wish to become licensed to service their own equipment. In no event will ArjoHuntleigh be responsible for any service performed by customers or third parties.

This manual contains information on maintenance, servicing, repair, troubleshooting and testing for the *Nimbus® 4* and *Nimbus® Professional* systems which comprise a pump and a mattress. Read and understand this manual before attempting to service or repair the equipment.

In addition to the service details contained within this manual, service engineers should also ensure that any work is also in compliance with their national legislation relating to maintenance and repair of electrical medical devices.

Numbering and Cross-Referencing in this Manual

For all chapters in this manual:

- Chapter page numbering is continuous. Section and paragraph numbering re-start at “1” in each chapter.
- Figure and table numbering continue from the previous chapter.
- Cross-references, which include a chapter number (and/or chapter title) refer to text in a different chapter. Cross-references which do NOT include any chapter number (or chapter title) refer to text within the same chapter.

Warnings, Cautions and Notes

WARNINGS given in this manual identify possible hazards in procedures or conditions which, if not correctly followed, could result in death, injury or other serious adverse reactions.

Cautions given in this manual identify possible hazards in procedures or conditions which, if not correctly followed, could result in equipment failure or damage.

Notes given in this manual are used to explain or amplify a procedure or condition.

WARNING: BEFORE PERFORMING ANY SERVICE OR MAINTENANCE PROCEDURES, ENSURE THAT THE EQUIPMENT HAS BEEN ADEQUATELY DECONTAMINATED.

WARNING: BEFORE DISMANTLING THE PUMP, ENSURE UNIT HAS BEEN ISOLATED FROM THE POWER SUPPLY BY REMOVING THE CORD PLUG FROM THE WALL OUTLET.

WARNING: VOLTAGES IN EXCESS OF 30 VOLTS RMS OR 50 VOLTS DC CAN, IN CERTAIN CIRCUMSTANCES, BE LETHAL. WHEN WORKING ON EQUIPMENT REQUIRING EXPOSURE TO LIVE, UNPROTECTED CONDUCTORS WHERE SUCH VOLTAGES ARE PRESENT, EXTREME CARE MUST BE EXERCISED.

Warning: *Static Sensitive Devices. Electrostatic discharge can seriously damage the PCB assemblies. This pump should only be opened by personnel trained in ESD methods and with appropriate equipment and anti-static protection.*

2 General

Regulatory

The *Nimbus 4* and *Nimbus Professional* system have been designed to comply with regulatory safety standards including:

- EN60601-1:1990/A13:1996 and IEC 60601-1:1988/A2:1995
- UL60601-1, UL2601-1 and CAN/CSA C22.2 No. 601.1-M90
- EN60601-1:2006 and IEC 60601-1:2005 and BS EN60601-1-11:2010
- AAMI/ANSI ES60601-1:2006 and CAN/CSA C22.2 No.60601.1(2008)

Precautions

For your own safety and the safety of the equipment, always take the following precautions:

- Do not expose the system to open flames, such as cigarettes, etc.
- Do not use or store the system in direct sunlight.
- Do not use phenol-based solutions to clean the system.
- Make sure the system is clean and dry before use or storage.

Electromagnetic Compatibility (EMC)

This product complies with the requirements of applicable EMC Standards. Medical electrical equipment needs special precautions regarding EMC and needs to be installed in accordance with the following instructions:

- The use of accessories not specified by the manufacturer may result in increased emissions by, or decreased immunity of, the equipment, affecting its performance.
- Portable and mobile radio frequency (RF) communications equipment (e.g. mobile/cell phones) can affect medical electrical equipment.
- If this equipment needs to be used adjacent to other electrical equipment, normal operation must be confirmed before use.

Environmental Protection

Incorrect disposal of this equipment and its component parts, particularly batteries or other electrical components, may produce substances that are hazardous to the environment. To minimise these hazards, contact ArjoHuntleigh for information on correct disposal.

3 About *Nimbus 4* and *Nimbus Professional*

Nimbus 4 and *Nimbus Professional* are highly effective Dynamic Flotation Systems providing active therapy for the prevention, treatment and management of pressure ulcers.

The systems comprise a pump and mattress replacement which can be used on standard hospital and normal domestic beds. Beds with divided sections for independent elevation of a patient's head and/or knees can be adjusted with these mattresses in position.

Both systems use the same *Nimbus* pump, which has two operating modes:

- **Dynamic** mode that cycles the support surface beneath the patient every 10 minutes providing periods of pressure relief for the whole body.
- **Static** mode where the support surface remains constant (all cells equally inflated).

The *Nimbus Professional* mattress combines all the qualities of the *Nimbus* range of mattresses with the added benefit of optional head cell deflate; this will assist the clinician with a range of nursing procedures including prone nursing, intubation, neck cannulation and hygiene, while the body of the mattress continues to provide optimal alternating pressure redistribution.

Both mattresses have been designed with specialised Vent Valves, so that some of the cells (including the three head cells on the *Nimbus Professional* mattress) can be selectively deflated to assist with pressure area care and patient management.

The mattresses incorporate an advanced *AutoMatt*® sensor pad which ensures the patient is automatically supported at optimum pressures regardless of size, height, position or weight distribution.

Both mattresses incorporate the five *Heelguard*[®] cells at the foot end of the mattress which ensure that the patient's heels are provided with the maximum pressure relief.

If cardiac arrest occurs, the mattresses can be rapidly deflated using the CPR (Cardio-Pulmonary Resuscitation) Control to allow cardiac resuscitation procedures to be performed.

Dynamic Mode

In dynamic mode the support surface beneath the patient is cycled every 10 minutes providing periods of pressure relief for the whole body.

Figure 1 and Figure 2 show how the system operates in dynamic and static modes. Figure 2 shows the pneumatic circuit in principle. A dual compressor system is used to provide a source of air supply. This is fed to a high pressure switch, the Auto-Matt sensor and a rotary valve. The high pressure switch is used to detect system over-pressures through blockages. The low pressure switch, which is located in the pressure control assembly, is used to detect if the air pressure in the system falls below minimum. The rotary valve channels the air supply as shown below:

C to outlet A with B at atmosphere (D)	- A & C Cells Inflated
C to outlet A and B	- All Cells Inflated (A, B & C)
C to outlet B with A at atmosphere (D)	- B & C Cells Inflated
C to outlet A and B	- All Cells Inflated (A, B & C)

This then allows cells A and B in the mattress to be inflated and deflated in a cycle period of ten minutes.

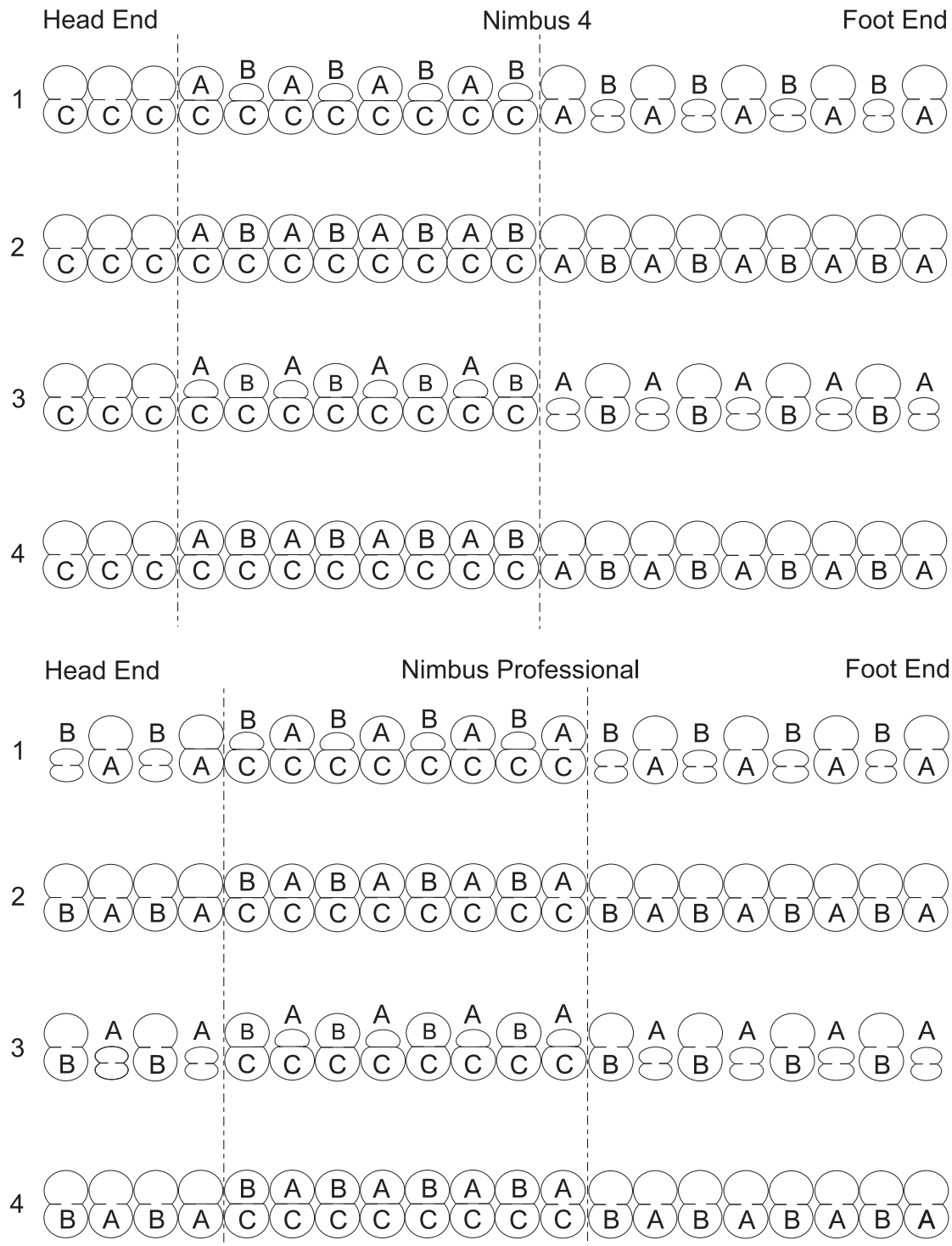


Figure 1 - Mattress Cell Inflation Cycle

In the mattress there is a third section of cells labelled as C. These are fed through partial non-return valves from cells A and B and are therefore never at zero pressure. These are positioned as shown in Figure 1 to prevent the torso section from 'bottoming' during dynamic mode and when a patient is sitting upright. Semi-dynamic pressure is also applied to the heel protector (above CPR unit) and the head cells (Nimbus 4 only, not Professional) for added patient comfort.

On **Nimbus 4** and **Nimbus Professional**, loop sheets, the heel cells have a special powered-down feature to facilitate fast deflation and thereby improve pressure relief under the heels.

Static Mode

In static mode the support surface is kept constant and provides pressure reduction without cycling. The rotary valve is held in a constant position so that cells A, B, C and the heel protector are equally inflated.

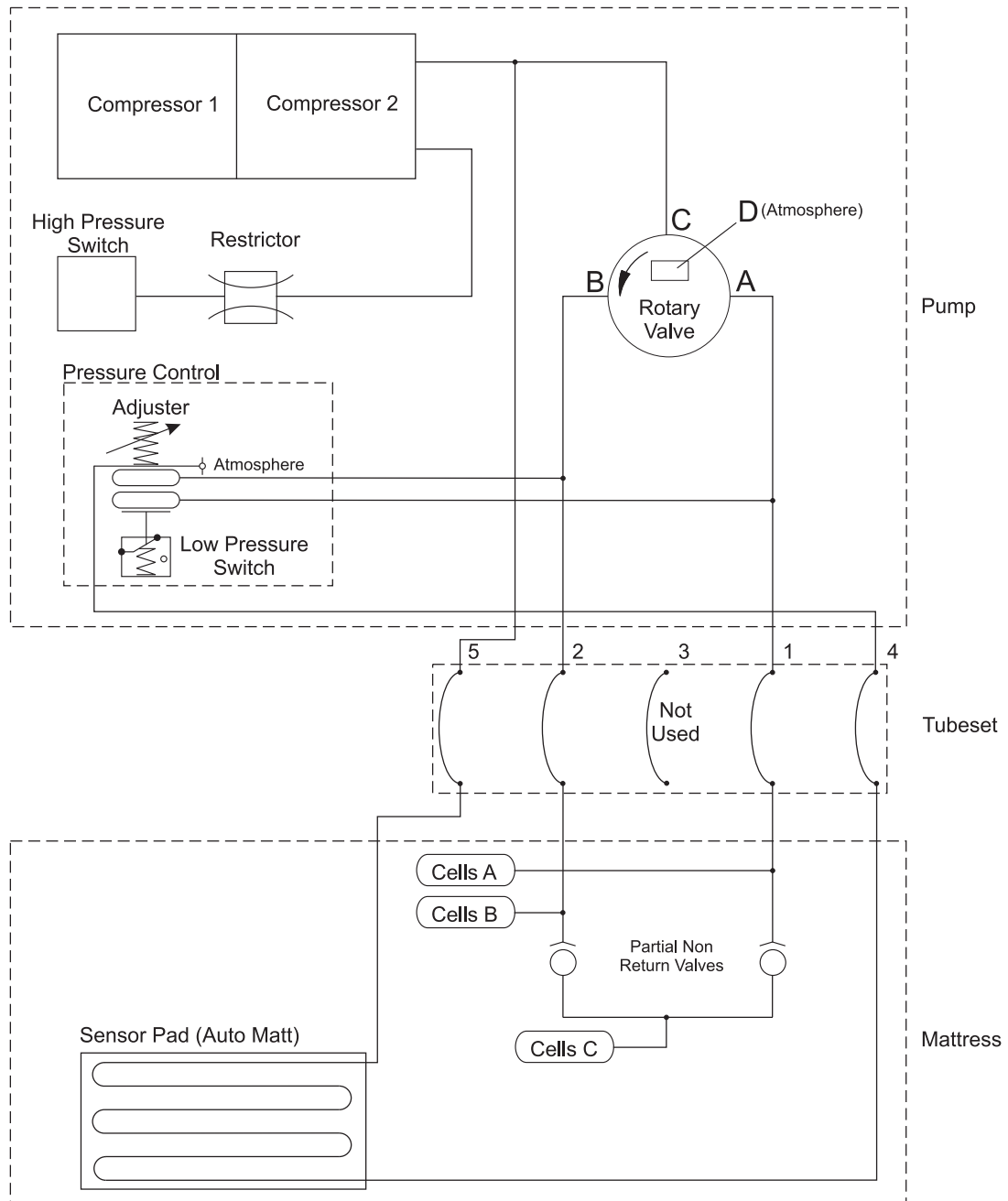


Figure 2 - Pneumatic System Diagram

Auto-Matt

The Auto-Matt sensor consists of a flexible air sensor pad which is located underneath the mattress cells. This acts as a pressure regulator and accommodates changes in patient weight and position in the following manner:

It is pneumatically connected in parallel to the mattress cells and when it is not occluded, it channels the air supply away from the cells. Occlusion of the Auto-Matt sensor is by patient weight and position. In this manner it allows internal mattress air pressures to be compensated to that required to support the patient.

With no patient on the mattress the Auto-Matt sensor is not occluded and pressure in the mattress is governed by the pressure control shown in Figure 2. This is in turn set to a pressure range which can be slightly adjusted to change mattress pressures for patient comfort.

With a patient on the mattress, pressure is exerted onto the cells and this can partially or totally occlude the Auto-Matt sensor. This results in more air being supplied to the cells increasing their internal pressure until full patient support is achieved. Should the patient change to a position which necessitates a lower pressure, air is released via the Auto-Matt sensor through the pressure control valve until the correct lower pressure is achieved in the cells.

System Start Up Sequence

After the pump is switched on the start up sequence is as follows:



- All display indicators illuminate for a few seconds.
- Low Pressure and Wait indicators remain illuminated while the mattress inflates (approx 20 Min). All the other indicators go out.
- The pump runs one compressor until the rotor turns to the cross over point (within 5 Min).
- The rotor then depresses the microswitch which stops the rotor and activates the second compressor.
- Both compressors run for 20 minutes or until the mattress reaches the minimum pressure setting.
- When the minimum pressure setting is reached the Low Pressure and Wait indicators go out.
- The pump cuts down to one compressor and the rotor starts to rotate.
- In Dynamic Mode the compressors will alternate every four hours.
- In Static Mode the Coils (4 off) alternate every four hours (one at a time). The compressors alternate depending on which coil is working (there are two coils in each compressor).





CHAPTER 2




TROUBLESHOOTING

1 Troubleshooting Table

The following table contains fault symptoms, their possible causes and suggests steps to rectify the problem. Where possible, reference is made to the relevant repair Chapters.

Fault	Possible Cause	Remedy
Pump fails to power up	Pump not connected to power supply.	Check power supply is available and reconnect or replace mains supply lead as necessary.
	Fuse blown.	Check mains plug fuse (UK models only) and pump fuse (all models). Replace if required. (Chapter 5, Page 57, Section 24)
High Pressure (HP) Alarm 	Mattress Auto Matt tube kinked.	Rectify or replace the tube.
	Tuberset kinked or blocked.	Clear blockage or replace. (Chapter 6, Page 87, Section 25)
	Pump Pressure control incorrectly set or faulty.	Reset or replace. (Chapter 5, Page 61, Section 27 and Section 28)
	Faulty HP switch.	Replace. (Chapter 5, Page 63, Section 29 and Section 30)
	Blocked Bio-Filter.	Replace. (Chapter 5, Page 66, Section 32 and Section 33)
	The AutoMatt sensor is blocked.	Check that the AutoMatt is flat and not kinked.
Low Pressure (LP) Alarm 	Tuberset Incorrectly connected.	Check fitting.
	Damaged.	Replace. (Chapter 6, Page 87, Section 25)
	Mattress 5-way gasket & Pump damaged. Pump 5-way gasket damaged.	Replace. (Chapter 6, Page 93, Section 29) Replace. (Chapter 5, Page 46, Section 17)

Fault	Possible Cause	Remedy
<p>Low Pressure (LP) Alarm continued</p> 	<p>Mattress in TRANSPORT mode.</p> <p>CPR assembly not fully closed.</p> <p>Cell leak.</p> <p>Leak in nonMarch 2015-return valves.</p> <p>Manifold Leak.</p> <p>Mattress Transit control seal damaged.</p> <p>Auto Matt disconnected.</p>	<p>Return to NORMAL mode.</p> <p>Reset the CPR.</p> <p>Trace and replace. (Chapter 6, Page 74, Section 6)</p> <p>Replace. (Chapter 6, Page 78, Section 15 and Section 16)</p> <p>Replace. (Chapter 6, Page 76, Section 9 and Section 10)</p> <p>Replace. (Chapter 6, Page 91, Section 27)</p> <p>Connect Auto Matt.</p>
	<p>Pump Damaged/disconnected tube.</p> <p>Faulty compressor.</p> <p>Blocked air filters.</p> <p>Faulty Low Pressure Switch.</p>	<p>Check internal tubing and replace if necessary.</p> <p>Check shuttle and replace if necessary. (Chapter 5, Page 44, Section 15)</p> <p>Replace. (Chapter 5, Page 41, Section 12)</p> <p>Test the switch and replace the Pressure Control Assy if necessary. (Chapter 5, Page 61, Section 27 and Section 28)</p>
<p>Low Pressure and Wait</p>  	<p>The pump is in the process of inflating the mattress.</p> <p>CPR control not fully closed.</p>	<p>Both indicators will extinguish when the operating pressure is reached.</p> <p>Close CPR control.</p>
<p>Service Indicator Light On</p> 	<p>The pump requires service.</p>	<p>Service the pump. (Chapter 3, Page 12, Section 3)</p> <p>Note: Pump should still be operable.</p>

Fault	Possible Cause	Remedy
Power Fail Alarm 	Pump Battery discharged. Battery failure.	Leave unit on for 24 hours to recharge. Replace battery (Chapter 5, Page 66, Section 34)
Power Fail Alarm With Unit Off 	Pump Faulty Mains/Power Switch. Poor connection between Power and Control Boards.	Check and replace. (Only applies to early versions with more than one PCB) (Chapter 5, Page 63, Section 30.5) Check and repair.
Pump Fault Alarm 	Pump Rotor Assy faulty. Main PCB Faulty.	Check and replace the Rotor Assy if necessary. (Chapter 5, Page 48, Section 18 and Section 19) Check and replace if necessary (Chapter 5, Page 50, Section 20)
Mattress cells will not inflate	Vent valves are open.	Close vent valves.

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CHAPTER 3

MAINTENANCE

1 Pump Maintenance Checks

If any parts are found to be damaged they must be replaced in accordance with Chapter 5 “Pump Repair”.


- 1.1 Visually inspect the following for damage, wear and potential faults:
 - 1.1.1 Outer Casing Check for damage and security.
 - 1.1.2 Switches, Control Knobs Check function.
 - 1.1.3 Hanging Bracket Check for damage and security.
 - 1.1.4 Outlet ports Check for damage and free from obstructions.
 - 1.1.5 Rubber feet (8 Off) Check for security.
 - 1.1.6 Fuses Check condition.
 - 1.1.7 Front panel Check for damage to LEDs and buttons.
 - 1.1.8 Mains/Power lead Check for damage and security of plug.
 - 1.1.9 Labels Check all labels are present and legible.
- 1.2 Disassemble the Rear Case (Chapter 5, Page 33, Section 4) and visually inspect the following for damage, wear, security and potential faults:
 - 1.2.1 Compressor
 - 1.2.2 Rotary Valve Assembly
 - 1.2.3 Printed Circuit Boards (PCBs)
 - 1.2.4 Pressure Control Assembly
 - 1.2.5 High Pressure Switch
 - 1.2.6 Silencer Bag
 - 1.2.7 Bio Filter
 - 1.2.8 Tubing and Wiring
 - 1.2.9 Screws, Nuts and bolts
- 1.3 Remove the compressor lids and visually inspect the following for damage, wear and potential faults:
 - 1.3.1 Coils
 - 1.3.2 Elbows and connectors
 - 1.3.3 Filters and gaskets
 - 1.3.4 Shuttle Valve Assemblies

2 Pump Soak Times

- 2.1 A pump must be soaked with its ports occluded for the following reasons:
 - To ensure that the pump is at normal running temperature prior to pneumatic performance tests being carried out.
 - To stress test major/critical parts which have been replaced or repaired.

- 2.2 All pumps should be soaked for a period of 30 to 60 minutes prior to any pneumatic performance test being carried out.
- 2.3 If any of the following major/critical components have been replaced or repaired, then it is recommended that the pump be soaked for 12 hours before being tested:
- Valve Shuttle Assemblies
 - Silencer Bags
 - Printed Circuit Boards (PCBs)
 - Compressor
 - Rotary Valve Assembly

3 Pump Service

A pump should be serviced every 12 months or when the  symbol is illuminated. To carry out a service on the pump, do the following:

- 3.1 Carry out the Pump Maintenance Checks (Chapter 3, Page 11, Section 1).
- 3.2 Replace the following components:
- 3.2.1 Case Seal (Chapter 5, Page 33, Section 4 and Section 5).
 - 3.2.2 Valve Shuttle Assemblies (Chapter 5, Page 44, Section 15).
 - 3.2.3 Compressor AV Mounts (Chapter 5, Page 38, Section 10 and Section 11).
 - 3.2.4 Compressor Filters (Chapter 5, Page 41, Section 12).
 - 3.2.5 Case Filter (Chapter 5, Page 35, Section 6).
 - 3.2.6 Pump Manifold Gasket (Chapter 5, Page 46, Section 17).
- 3.3 Reassemble the pump and soak for the recommended time (Refer to Page 11, Section 2).
- 3.4 Carry out a flow, pressure and function test on the pump in accordance with Chapter 4, Page 15, Section 1.
- 3.5 Carry out electrical tests on the pump in accordance with Chapter 4, Page 27, Section 8.

4 Mattress Maintenance Checks

If any parts are found to be damaged they must be replaced in accordance with Chapter 6 "Mattress Repair".

- 4.1 Visually inspect the following for damage, wear and potential faults:
- | | | |
|--------|--------------------|-------------------------------------------------------|
| 4.1.1 | Base and Top Cover | Check for tears, staining, clarity of printed labels. |
| 4.1.2 | Base/Top Cover Zip | Check the zip runs freely and condition of zip teeth. |
| 4.1.3 | Anti-slip pads | Check for damage. |
| 4.1.4 | Fixing straps | Check condition and security. |
| 4.1.5 | Loop sheet | Check for broken/torn loops. |
| 4.1.6 | Auto Matt | Check condition and security of tubes. |
| 4.1.7 | Soft/Hard Foam | Check condition. |
| 4.1.8 | Connectors | Check for damage and security. |
| 4.1.9 | Tubing | Check for security and ensure no kinks or twists. |
| 4.1.10 | Cells | Check for damage and security. |

4.1.11	Manifold	Check for damage and security.
4.1.12	Partial Non-Return Valves	Check for condition.
4.1.13	Heel Protector	Check for damage and security.
4.1.14	Pop Studs	Check condition.
4.1.15	CPR Unit	Check operation of Fast Deflate mechanism.
4.1.16	CPR Transport Knob	Check operation.
4.1.17	CPR Inlet Manifold	Check for damage and free from obstructions.
4.1.18	Tubaset assembly	Check for damage and security of connection.
4.1.19	Vent Valves	Check operation.

5 Mattress Service

To carry out a service on the mattress, do the following:

- 5.1 Carry out the Mattress Maintenance Checks (Refer to Page 12, Section 4).
- 5.2 Check the following components and replace if necessary:
 - 5.2.1 CPR 'O' rings (Chapter 6, Page 91, Section 26).
 - 5.2.2 CPR Manifold Gasket (Chapter 6, Page 93, Section 29).
- 5.3 Carry out an inflation test on the mattress in accordance with Chapter 4, Page 28, Section 9.

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CHAPTER 4

TESTING

1 Pump Flow, Pressure and Function Test

This procedure must be carried out after a service or major repair of a pump. To test/calibrate the pump unit correctly, the following equipment is required:

Table 1 - Pump Flow, Pressure and Function Test Equipment

Equipment	Part Number
Dual Pressure Gauge (0-160 mm/Hg)/ flow meter (0-25 ltr/min)	PRE073
5-way test tubeset adaptor	151126
Psion Organiser with Service Module Adaptor or IR Interface Module, connected to a Personal Computer	Ref Ref MIS216-

- 1.1 If the Psion Organiser is used to test the pump, it is assumed that the service personnel are familiar with the Psion Organiser user guide.
- 1.2 If the IR Interface Module is used to test the pump, it is assumed that the service personnel are familiar with the IR Interface User Manual, 151910.
- 1.3 All test equipment must be calibrated to national or international standards.

Test Setup

- 1.4 Connect the pump to a mains/power supply and switch the pump on.
- 1.5 All indicators on the front panel of the pump should illuminate for a few seconds and then display **ON**, **WAIT** and **LOW PRESSURE**.
- 1.6 Connect the pump to the dual pressure gauge/flow meter using the 5-way test tubeset adaptor.

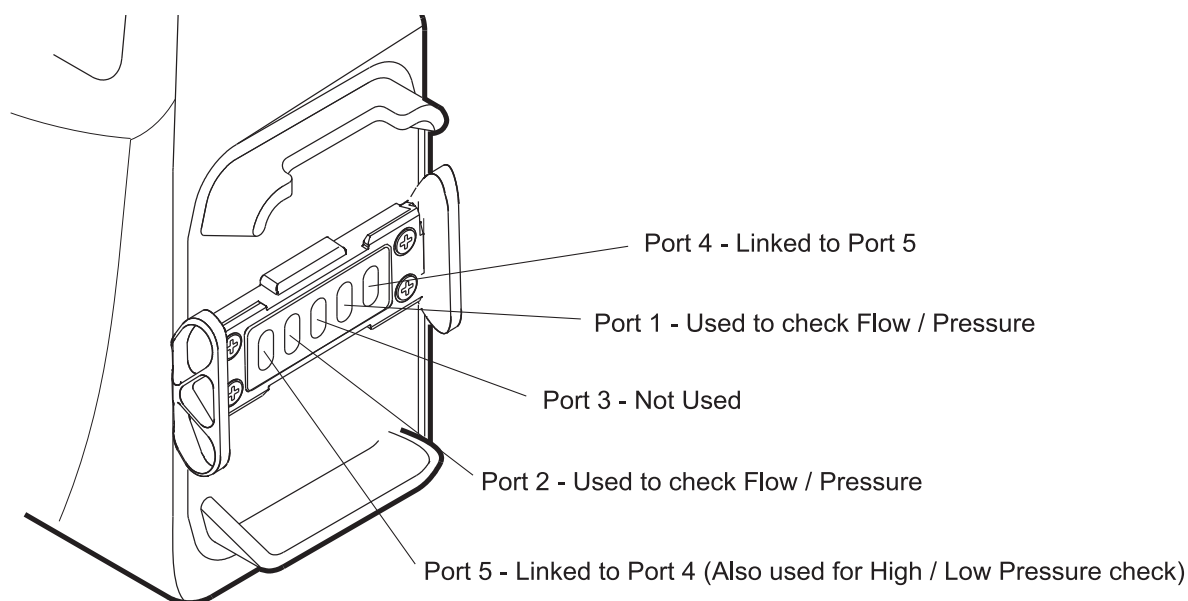


Figure 3 - Pump Outlet Ports

Power Fail Alarm Check

- 1.7 Switch the pump off at the mains/power socket, leaving the pump switched **ON**. The pump responds by illuminating the flashing **RED TRIANGLE** and the **POWER** message while sounding an **AUDIBLE ALARM**.
- 1.8 Push the **MUTE** button and the audible alarm is silenced.
- 1.9 Switch the pump back on at the mains/power socket. The pump can respond in two ways:
 - If the **Power Fail Option** is on - The **POWER** indicator illuminates but there is no audible alarm (Except UK).
 - If the **Power Fail Option** is off - There is nothing displayed on the front panel and no audible alarm (UK Only).

Note: Make sure the option is set correctly for the country of use.

Alarm Functions

- 1.10 Switch the pump off and on again.
- 1.11 Remove the tubeset adaptor from the pump manifold. The pump responds by illuminating the **LOW PRESSURE** indicator.
- 1.12 Replace the tubeset adaptor on the pump manifold. The **LOW PRESSURE** indicator extinguishes.
- 1.13 Slowly occlude the tubeset loop between ports 4 and 5 until the **HIGH PRESSURE** indicator illuminates. The pump should now cut out and the **HIGH PRESSURE** indicator extinguishes. Keep the tubeset loop occluded.
- 1.14 After the pressure has dropped the pump should restart and the **HIGH PRESSURE** indicator illuminates again, together with the **RED TRIANGLE** and an **AUDIBLE ALARM**.

High/Low Pressure Setpoint and Mute Mode Checks

- 1.15 To carry out the High and Low Pressure Switch Setpoint Checks and the Mute Mode Check, refer to the specific test procedure for the type of test equipment being used:
 - If the Psion Organiser is used, carry out the procedure on Page 17, Section 2.
 - If the IR Interface Module is used, carry out the procedure on Page 18, Section 3.

Static and Dynamic Mode Pressure Tests

- 1.16 To carry out the Static and Dynamic Mode Pressure Tests, refer to the specific test procedure for the type of test equipment being used:
 - If the Psion Organiser is used, carry out the procedure on Page 19, Section 4.
 - If the IR Interface Module is used, carry out the procedure on Page 22, Section 5.

2 High/Low Pressure Setpoint Checks and Mute Mode Check using the Psion Organiser

Psion Organiser Setup

2.1 Refer to Page 25, Section 6 to set up the Psion Organiser.

High Pressure Switch Setpoint Check

2.2 Select **Inputs** from the Psion menu. The Psion will now display:

**Reading HP switch
off
Press any key for LP**

2.3 Slowly occlude the tubeset loop between ports 4 and 5 and record the pressure on the manometer at which the Psion display changes to:

**Reading HP switch
on
Press any key for LP**

Low Pressure Switch Setpoint Check

2.4 Press any key on the Psion, except for **Q**. The Psion will now display:

**Reading LP switch
off
Press any key for
mute mode**

2.5 Remove the tubeset adaptor from the pump manifold and record whether or not the display changes to:

**Reading LP switch
on
Press any key for
mute mode**

2.6 Reconnect the tubeset to the pump.

Mute Mode Check

2.7 Press any key on the Psion, except for **Q**. The Psion will now display:

Mute mode set to
0
Press key for
valve microswitch

OR

Mute mode set to
1
Press key for
valve microswitch

2.8 Check the **MUTE** mode is set correctly for the country of use (0 for the UK and 1 for the rest of the world). Press any key on the Psion, except **Q**, the Psion will now display:

Valve microswitch
(on/off) *
Press key to exit

3 High/Low Pressure Setpoint Checks and Mute Mode Check using the IR Interface Module

IR Interface Setup

3.1 Refer to Page 25, Section 7 for the set up and usage of the IR Interface.

3.2 Select the **Test** tab on the PC, enter the password **TEKKICHECK**, and the **Test** tab is displayed (Refer to Figure 4).

Note: The password is not case sensitive.

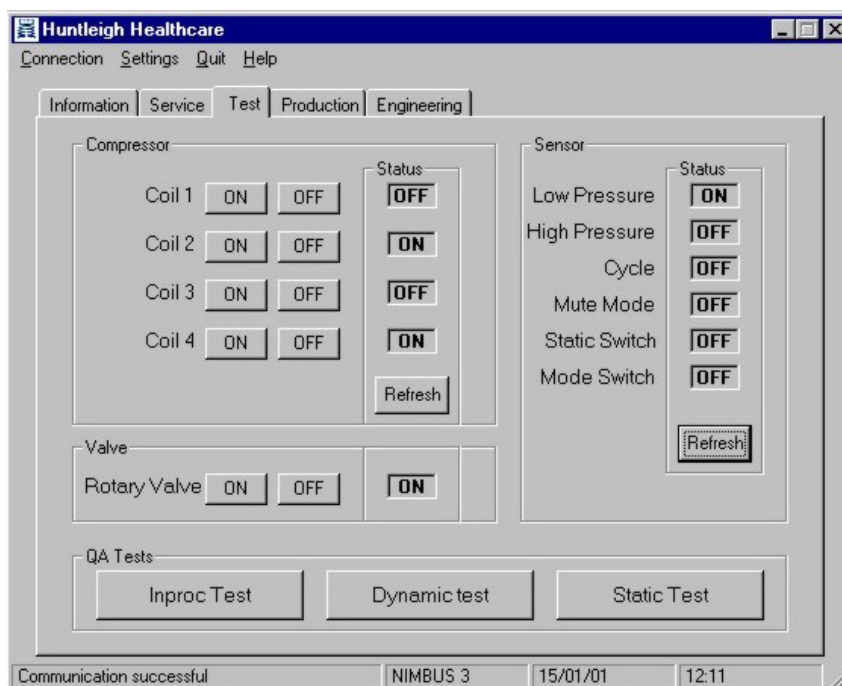


Figure 4 - Test Tab on the PC connected to the IR Interface

High Pressure Switch Setpoint Check

- 3.3 Click on **Refresh** at the bottom of the **Sensor - Status** column, and the **High Pressure - Status** should be set to **OFF**.
- 3.4 Slowly occlude the tubeset loop between ports 4 and 5, and record the pressure on the manometer at which the **High Pressure - Status** changes to **ON**.

Low Pressure Switch Setpoint Check

- 3.5 Click on **Refresh** at the bottom of the **Sensor - Status** column, and the **Low Pressure - Status** should be set to **OFF**.
- 3.6 Remove the tubeset adaptor from the pump manifold, and record whether or not the **Low Pressure - Status** changes to **ON**.
- 3.7 Reconnect the tubeset to the pump.

Mute Mode Check

- 3.8 Click on **Refresh** at the bottom of the **Sensor - Status** column, and record whether the **Mute Mode - Status** is set to **OFF** or **ON**.
- 3.9 Check that the **Mute Mode - Status** is set correctly for the country of use (**OFF** for the UK and **ON** for the rest of the world).

4 Static and Dynamic Mode Pressure Tests using the Psion Organiser

Static and Dynamic Mode Calibration Readings

The following table gives the calibration readings to be used in the Static and Dynamic Pressure tests that follow.

Table 2 - Static and Dynamic Mode Calibration Readings

Mode	Port	Coils	Comfort Control Setting	Pressure	Flow
Static	1 & 2	Each	Min (Soft)	15 - 19 mm/Hg	> 6 ltrs/min
			Max (Firm)	22 - 29 mm/Hg	
Dynamic	1 & 2	1 & 3 2 & 4	Min (Soft)	22 - 26 mm/Hg	> 9 ltrs/min < 14 ltrs/min
			Max (Firm)	32 - 40 mm/Hg	

Adjusting the Pressure

Carefully prise the control knob (Chapter 5, Page 60, Fig 21, Item 40) off the front panel. Turn the centre screw clockwise to increase the pressure or counter-clockwise to decrease the pressure.

Psion Organiser Setup

Refer to Page 25, Section 6 to set up the Psion Organiser.

Static Mode Pressure Tests

- 4.1 Select **Test** from the Psion menu. Wait (for up to 5 minutes) until the Psion display changes from:

Please wait
for crossover

TO

Rotor in crossover
position.
Coil 1 on.
Go to next coil Y/N?

- 4.2 Record the manometer reading for coil 1, with the comfort control set to minimum and maximum settings.
- 4.3 Press **Y** on the Psion. The Psion will now display:

Rotor in crossover
Position.
Coil 2 on.
Go to next coil Y/N?

- 4.4 Record the manometer reading for coil 2, with the comfort control set to minimum and maximum settings.
- 4.5 Press **Y** on the Psion. The Psion will now display:

Rotor in crossover
Position.
Coil 3 on.
Go to next coil Y/N?

- 4.6 Record the manometer reading for coil 3, with the comfort control set to minimum and maximum settings.
- 4.7 Press **Y** on the Psion. The Psion will now display:

Rotor in crossover
Position.
Coil 4 on.
Go to next coil Y/N?

- 4.8 Record the manometer reading for coil 4, with the comfort control set to minimum and maximum settings.

- 4.9 If all the tests have been completed OK, press **N** on the Psion. The Psion will now display:

**Rotor in crossover
Position.
Coils 1 & 3 on -
Change to 2 & 4 Y/N?**

- 4.10 Press **N** again on the Psion. The Psion will display:

**Go to Dynamic Test
Y/N?**

- 4.11 Press **Y** on the Psion. Wait (up to 3 minutes) until the display changes to:

**Rotor in port 1
Position.
Coils 1 & 3 on.
Press key for 2 & 4**

Dynamic Mode Pressure Tests

- 4.12 Connect duty outlet port to the pressure gauge. Record the manometer reading for Port 1, coils 1 & 3, with the comfort control set to minimum and maximum settings.
- 4.13 Open the restrictor or connect to the flow meter and record the air flow of Port 1, coils 1 & 3.
- 4.14 Press any key, except **Q** on the Psion. The display will change to:

**Rotor in port 1
Position.
Coils 2 & 4 on.
Press key for port 2**

- 4.15 Close the restrictor or reconnect to the pressure gauge.
- 4.16 Record the manometer reading for Port 1, coils 2 & 4, with the comfort control set to minimum and maximum settings.
- 4.17 Open the restrictor or connect to the flow meter and record the air flow of Port 1, coils 2 & 4.

- 4.18 Press any key, except **Q** on the Psion. The display will change to:

Rotor in port 2
Position.
Coils 1 & 3 on.
Press key for 2 & 4

- 4.19 Connect the pressure gauge/flow meter to Port 2.
- 4.20 Close the restrictor. Record the manometer reading for Port 2, coils 1 & 3, with the comfort control set to minimum and maximum settings.
- 4.21 Open the restrictor or connect to the flow meter and record the air flow of Port 2, coils 1 & 3.
- 4.22 Press any key, except **Q** on the Psion. The display will change to:

Rotor in port 2
Position.
Coils 1 & 3 on.
Press key for 2 & 4

- 4.23 Close the restrictor. Record the manometer reading for Port 2, coils 2 & 4, with the comfort control set to minimum and maximum settings.
- 4.24 Open the restrictor or connect to the flow meter and record the air flow of Port 2, coils 2 & 4.
- 4.25 If all the tests have been completed satisfactorily, press N.

Check Pump Serial Number

- 4.26 Select **Serial** on the Psion. Cross reference the serial number displayed with the serial number on the pump case. Record numbers in the Service History.

Note:

Note: Do not activate any Alarm functions after this test procedure has been carried out as the Alarm counters have been reset to zero.

5 Static and Dynamic Mode Pressure Tests using the IR Interface

Static and Dynamic Mode Calibration Readings

Refer to Page 19, Table 2 for the calibration readings to be used in the Static and Dynamic Pressure tests that follow.

Adjusting the Pressure

Carefully prise the control knob (Chapter 5, Page 60, Fig 21, Item 40) off the pump front panel. Turn the centre screw clockwise to increase the pressure or counterclockwise to decrease the pressure.

IR Interface Setup

- 5.1 Refer to Page 25, Section 7 for the set up and usage of the IR Interface.
- 5.2 Select the **Test** tab on the PC, enter the password **TEKKICHECK**, and the **Test** tab is displayed (Refer to Figure 4).

Note: *The password is not case sensitive.*

Static Mode Pressure Tests

- 5.3 Click on **Static Test** to start the test running.
- 5.4 A dialog box with **Switching coils off**, followed by **Refreshing sensor status** is displayed.
- 5.5 Wait for the rotary valve to reach the crossover position, at which time the rotary valve is switched off. During this period, the dialog box **Waiting for crossover. This may take up to 5 minutes** is displayed.
- 5.6 When the crossover position is reached, the dialog box **Rotor in crossover position. Switch ON Coil 1?** is displayed.
- 5.7 Click **OK** on the dialog box.
- 5.8 Coil 1 is switched on, and the dialog box **Rotor in crossover position. Coil 1 ON. Switch ON Coil 2?** is displayed.
- 5.9 Record the manometer reading for coil 1, with the comfort control on the pump set to minimum and maximum settings.
- 5.10 Click **OK** on the dialog box.
- 5.11 Coil 1 is switched off, and then coil 2 is switched on. The dialog box **Rotor in crossover position. Coil 2 ON. Switch ON Coil 3?** is displayed.
- 5.12 Record the manometer reading for coil 2, with the comfort control set to minimum and maximum settings.
- 5.13 Click **OK** on the dialog box.
- 5.14 Coil 2 is switched off, and then coil 3 is switched on. The dialog box **Rotor in crossover position. Coil 3 ON. Switch ON Coil 4?** is displayed.
- 5.15 Record the manometer reading for coil 3, with the comfort control set to minimum and maximum settings.
- 5.16 Click **OK** on the dialog box.
- 5.17 Coil 3 is switched off, and then coil 4 is switched on. The dialog box **Rotor in crossover position. Coil 4 ON. Repeat Test Sequence?** is displayed.
- 5.18 Record the manometer reading for coil 4, with the comfort control set to minimum and maximum settings.
- 5.19 If all the tests have been completed satisfactorily, click **Abort Test** to end the test (or **OK** to repeat the test).

Dynamic Mode Pressure Tests

- 5.20 Click on **Dynamic Test** to start the test running.
- 5.21 A dialog box with **Switching coils off**, followed by **Refreshing sensor status** is displayed.
- 5.22 Wait for the rotary valve to reach the crossover position, at which time the rotary valve is switched off. During this period, the dialog box **Waiting for crossover. This may take up to 5 minutes** is displayed.
- 5.23 When the crossover position is reached, the dialog box **Rotor in Port 1 position. Switch ON Coil 1 and 3?** is displayed.
- 5.24 Click **OK** on the dialog box.
- 5.25 Coils 1 and 3 are switched on, and the dialog box **Rotor in Port 1 position. Switch on Coil 2 and 4?** is displayed.
- 5.26 Connect duty outlet port to the pressure gauge. Record the manometer reading for Port 1, Coils 1 & 3, with the comfort control set to minimum and maximum settings.

- 5.27 Open the restrictor or connect to the flow meter, and record the air flow of Port 1, Coils 1 & 3.
- 5.28 Click **OK** on the dialog box.
- 5.29 Coils 1 and 3 are switched off, and then coils 2 and 4 are switched on. The dialog box **Rotor in Port 1 position. Press OK for Port 2?** is displayed.
- 5.30 Close the restrictor or reconnect to the pressure gauge.
- 5.31 Record the manometer reading for Port 1, Coils 2 & 4, with the comfort control set to minimum and maximum settings.
- 5.32 Open the restrictor or connect to the flow meter, and record the air flow of Port 1, Coils 2 & 4.
- 5.33 Click OK on the dialog box to repeat the test procedure for Port 2.
- 5.34 Wait for the rotary valve to reach the crossover position, at which time the rotary valve is switched off. During this period, the dialog box **Waiting for crossover. This may take up to 5 minutes** is displayed.
- 5.35 When the crossover position is reached, the dialog box **Rotor in Port 2 position. Switch ON Coil 1 and 3?** is displayed.
- 5.36 Click **OK** on the dialog box.
- 5.37 Coils 1 and 3 are switched on, and the dialog box **Rotor in Port 2 position. Switch on Coil 2 and 4?** is displayed.
- 5.38 Connect duty outlet port to the pressure gauge. Record the manometer reading for Port 2, Coils 1 & 3, with the comfort control set to minimum and maximum settings.
- 5.39 Open the restrictor or connect to the flow meter, and record the air flow of Port 2, Coils 1 & 3.
- 5.40 Click **OK** on the dialog box.
- 5.41 Coils 1 and 3 are switched off, and then coils 2 and 4 are switched on. The dialog box **Rotor in Port 2 position. Press OK for Port 1?** is displayed.
- 5.42 Close the restrictor or reconnect to the pressure gauge.
- 5.43 Record the manometer reading for Port 1, Coils 2 & 4, with the comfort control set to minimum and maximum settings.
- 5.44 Open the restrictor or connect to the flow meter, and record the air flow of Port 1, Coils 2 & 4.
- 5.45 If all the tests have been completed satisfactorily, click **Abort Test** to end the test (or **OK** to repeat the complete test).

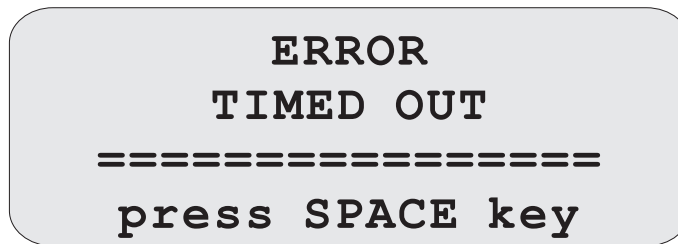
Check Pump Serial Number

- 5.46 Select the **Information** tab on the PC (Refer to Figure 6). You must click on **REFRESH** to read and display the data from the pump.
- 5.47 Cross reference that the **Pump Serial Number** displayed on the **Information** tab is same as the serial number on the pump case. Record the numbers in the Service History.

Note: *Do not activate any Alarm functions after this test procedure has been carried out as the Alarm counters have been reset to zero.*

6 Psion Organiser Setup

- 6.1 Switch the Psion on and select which type of pump is to be tested from the Psion menu.
- 6.2 If at any time the Psion indicates the following message, then press the **STATIC** and **MUTE** buttons together on the pump.



7 IR Interface Setup and Passwords for ProNimbus

- 7.1 Refer to the IR Interface User Manual, 151910, and carry out the following:
 - 7.1.1 Install and set up the IR Interface.
 - 7.1.2 Run the IRRemote software on the PC.
- 7.2 The **Connection** menu is displayed on the PC by default (Refer to Figure 5). Select the type of pump to be tested from the menu.

Note: For Nimbus 4 and Professional, select the option NIMBUS 3.



Figure 5 - Connection Menu on the PC connected to the IR Interface

- 7.3 When prompted by the PC, press the **STATIC** and **MUTE** buttons together on the pump, and click **OK**.
- 7.4 The **Information** tab is now displayed (Refer to Figure 6). You must click on **REFRESH** to read and display the data from the pump.
- 7.5 Infrared data transmission progress is indicated by the message **Communication successful** or **Communication unsuccessful** displayed in the lower left-hand corner of the dialog box.

Note: If the infrared data transmission status indicates **Communication unsuccessful** and/or a “?” is displayed in all the boxes on the **Information** tab (except a **V** in the **Software Version Number** box), then an error has occurred. Check the **Installation and Setup** section in the **IR Interface User Manual**, and then click on **REFRESH** again.

- 7.6 If at any time during the testing, the infrared data transmission status indicates **Communication unsuccessful**, then press the **STATIC** and **MUTE** buttons together on the pump.

The screenshot shows the 'Huntleigh Healthcare' software window with the 'Information' tab selected. The interface includes several data entry fields and a status bar. The fields are organized as follows:

- Top Section:** PCB Number (1980010795), Pump Serial Number (198000), and Software Version Number (V 1.3).
- Hours Section:** Hours Logged (596), Meter (0), and Last Service (596).
- Alarms history Section:** Power (2), System (0), High Pressure (1), LP Comp 1 (0), and LP Comp 2 (0).
- Action:** A large 'REFRESH' button is located below the alarms history.
- Status Bar:** At the bottom, it shows 'Communication successful', 'NIMBUS 3', the date '15/01/01', and the time '12:11'.

Figure 6 - Information Tab on the PC connected to the IR Interface

7.7 IR Interface Passwords:

- The **Information** tab is not password protected.
- The other four tabs (**Service**, **Test**, **Production** and **Engineering**) are password protected. Each of these tabs has a separate unique password.
- When any of the four password protected tabs is selected, an **Enter Password** dialog box is displayed. Type in the password, and click **OK**.
- If the password is correct, the particular tab is displayed.
- If the password is incorrect, access to the tab is denied, and an **Invalid Password** dialog box is displayed. Click **OK** and select the tab again to re-enter the password.
- The password for the **Service** tab is **SERVICE**.
- The password for the **Test** tab is **TEKKICHECK**.
- Passwords are not case sensitive.

Note: The **Production** and **Engineering** tabs are for internal ArjoHuntleigh use only. Should it be necessary to access either of these two tabs, please contact ArjoHuntleigh who will supply the relevant passwords to access the tabs.

8 Electrical Testing

To test and calibrate the pump unit correctly, the following equipment is required:

Table 3 - Electrical Test Equipment

Equipment
Insulation resistance tester (Megger) 500 Vdc
Portable appliance tester
Multimeter/Continuity tester
Dielectric strength tester (Flash tester) 3.0 kVac with current limit

Electrical Safety Checks - Class I

There are several electrical safety checks that must be carried out after breakdown repairs and servicing. Where alternatives are given, the test will depend upon the available equipment. The tests are as follows:

- Earth Continuity Tests
- Insulation Resistance Test (Megger Test) or
- Dielectric Strength (Flash Test)

Earth Continuity Tests

This test is for checking the earth continuity and the earth connection to the metal parts of the appliance, which may become live because of insulation breakdown (i.e. Those parts which should be earthed).

A voltage is established between the earth pin of the appliance's mains/power supply plug and the metal parts.

Specification: A (nominal) 25 Ampere current is passed for 10 seconds between the earth pin of the power plug, and each of the insulated metal parts designated for the product. The impedance should NOT exceed 0.2Ω .

This above test can be conducted with a Portable Appliance Tester.

Alternatively, a Multimeter/Continuity Tester can be utilised, but the impedance is tested using a much lower current.

Insulation Resistance Tests

This test checks the integrity of the appliance's insulation.

For all appliances, this test is applied between the Live and Neutral wires (connected together), and earth. In addition, this test is also applied to the Live and Neutral wires (connected together), and the appliance's enclosure.

Specification: 500 Vdc is applied to the insulation and the measured resistance must be greater than $2\text{ M}\Omega$.

This test can be conducted using a Portable Appliance Tester.

Dielectric Strength Test (Flash Test)

This test shows the response of the insulation to high ac-voltage stress, indicates the effects of capacitive current, and gives an early warning of insulation problems which may develop in the appliance.

Leakage Circuit Test (USA)

Measure the risk currents in accordance with the ANSI-AAMI ESI-1993 Standard (American National Standard Safe Current Limits for Electromedical Apparatus) or as specified in UL 2601-1).

Note: *The voltage levels used for this test, may stress and weaken the insulation. This test, is therefore not recommended as a routine test. It should be only used after a major assembly/disassembly has been completed.*

WARNING: DANGER OF ELECTRIC SHOCK. DO NOT TOUCH ANY EXPOSED PARTS WHILE CONDUCTING THIS TEST. DO NOT TOUCH ANY PART OF YOUR BODY WITH THE CONTACTS OF THE PROBES.

This equipment should not be used if you have a hearing aid or pacemaker fitted, due to the possibility of electromagnetic disturbance.

Specification:

- 1) 1.5 kVac is applied between the live and neutral wires (connected together), and the appliance earthed parts. No breakdown should occur.
- 2) 4 kVac is applied between the live and neutral wires (connected together) and the appliance non-earthed enclosure. No breakdown should occur.

9 Mattress Pressure and Function Test

This procedure must be carried out after a service or major repair of a mattress. To test/calibrate the mattress correctly, the following equipment is required:

Table 4 - Mattress Pressure and Function Test Equipment

Equipment
Pressure/Flow meter
Portable inflation test unit
Stop watch

Test Procedure

- 9.1 Ensure all Vent Valves are in the closed position.
- 9.2 Connect a portable inflation unit to the mattress.
- 9.3 Fully inflate the mattress and connect it to a pressure/flow meter and test to the following requirements:
 - Inflation test pressure 80 to 90 mmHg
 - Inflation stabilisation period 30 seconds
 - Inflation test period three minutes
 - Leak rate must not exceed 3 mmHg
- 9.4 Ensure correct Vent Valve operation by opening each Vent Valve in turn and observing that the relevant cell deflates.

Note: *If the mattress fails the tests, investigate the reason, repair any faults and re-test in accordance with the test specification.*

CHAPTER 5

PUMP REPAIR

WARNING: BEFORE DISMANTLING THE PUMP, ENSURE UNIT HAS BEEN ISOLATED FROM THE POWER SUPPLY BY REMOVING THE CORD PLUG FROM THE WALL OUTLET.

1 General

This chapter details repair procedures for the Nimbus 4 and Nimbus Professional pump. All repairs should be carried out by ArjoHuntleigh approved service personnel.

After carrying out a service or any repairs, the pump must be soaked for the recommended time (Refer to Chapter 3, Page 11, Section 2) and tested for serviceability. The table below defines the test requirements which must be carried out following certain repairs:

To carry out a flow, pressure and function test on the pump refer to Chapter 4, Page 15, Section 1.

To carry out the electrical tests on the pump refer to Chapter 4, Page 27, Section 8.

Table 5 - Repair to Testing Requirements

Components / Assemblies	Flow/Pressure & Function Test	Electrical Safety
Compressor	Yes	Yes
Pressure Control	Yes	Yes
Gearbox Assembly	Yes	Yes
Silencer Bag	Yes	No
High / Low Pressure Switches	Yes	Yes
Shuttle Assembly	Yes	Yes
Coils	Yes	Yes
Elbows & Connectors	Yes	No
AV Mounts	Yes	Yes
PCB	Yes	Yes
Front Casing	Yes	Yes
Rear Casing	No	No
Battery	No	Yes
Switches	No	Yes
Fuses	No	Yes
Electrical Connectors	No	Yes
Mains/Power Lead	No	Yes

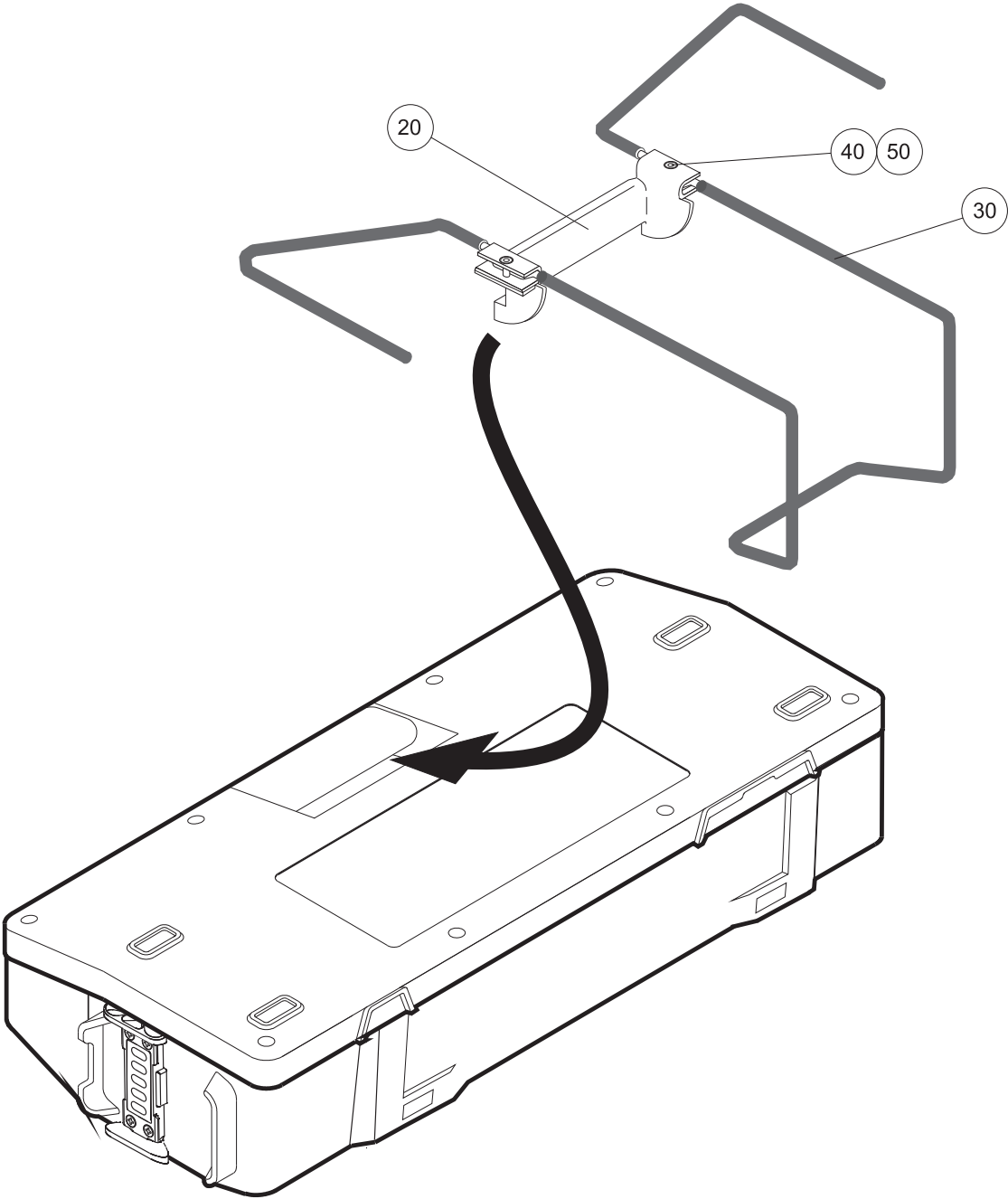


Figure 7 - Removing and installing the Hanging Bracket

Table 6 - Hanging Bracket Part List

Item	Part Number	Description	Qty
10	649123	Hanging Bracket Assembly	1
20	151427	Bracket	1
30	649428	Wire	1
40	FAS046	Screw M3 x 10 CSK	2
50	FAS216	Nut M3 x 0.5 Euro Series	2

2 Removing the Hanging Bracket

- 2.1 Ease the bottom of the hanging bracket off of the base of the pump.
- 2.2 Rotate the hanging bracket (Figure 7) and remove it from the handle recess in the back of the pump.

3 Installing the Hanging Bracket

- 3.1 Lay the pump face down and insert the bridge of the hanging bracket (Figure 7) into the handle recess of the pump.
- 3.2 Pull the bottom of the hanging bracket over the bottom of the pump and push firmly downwards so that the bracket clips into place around the base of the pump.

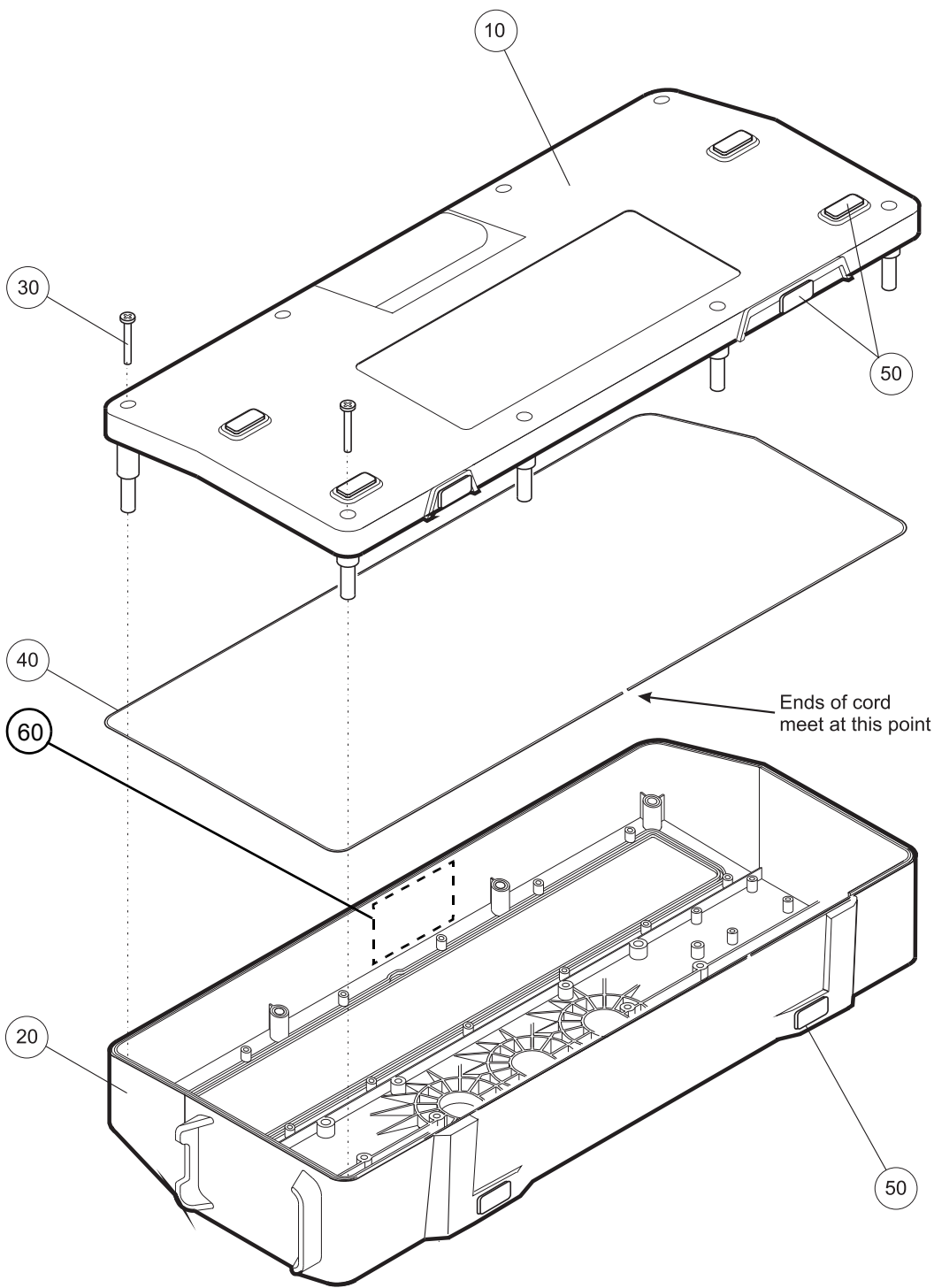


Figure 8 - Rear Case Assembly

4 Disassembling the Rear Case

WARNING: BEFORE DISMANTLING THE PUMP UNIT, ENSURE THE UNIT HAS BEEN ISOLATED FROM THE POWER SUPPLY BY REMOVING THE MAINS/POWER PLUG FROM THE WALL SOCKET.

- 4.1 Remove the hanging bracket from the pump (Refer to Chapter 5, Page 31, Section 2).
- 4.2 Place the pump unit on a flat surface with the front case (Fig 8, Item 20) face down.
- 4.3 Unscrew the 8 pan head screws (Fig 8, Item 30) and lift the rear case (Fig 8, Item 10) away from the front case (Fig 8, Item 20). Keep the screws (Fig 8, Item 30) in a safe place.
- 4.4 Carefully remove the neoprene sponge cord (Fig 8, Item 40) and inspect for damage.

5 Assembling the Rear Case

- 5.1 Assembly of the rear case is in the reverse order of disassembly.
- 5.2 Install the hanging bracket to the pump (Refer to Chapter 5, Page 31, Section 3).

Table 7 - Rear Case Parts List

Item	Part Number	Description	Qty
10	649052	Rear Case Assembly	1
20	649301	Front Case	1
30	FAS188	Pan Head Screws M4 x 30 mm	8
40	151105	Neoprene Sponge Cord (Dia 2 mm)	1
50	507413	Rubber foot	8
60	MIS350	Static Mode Label	1

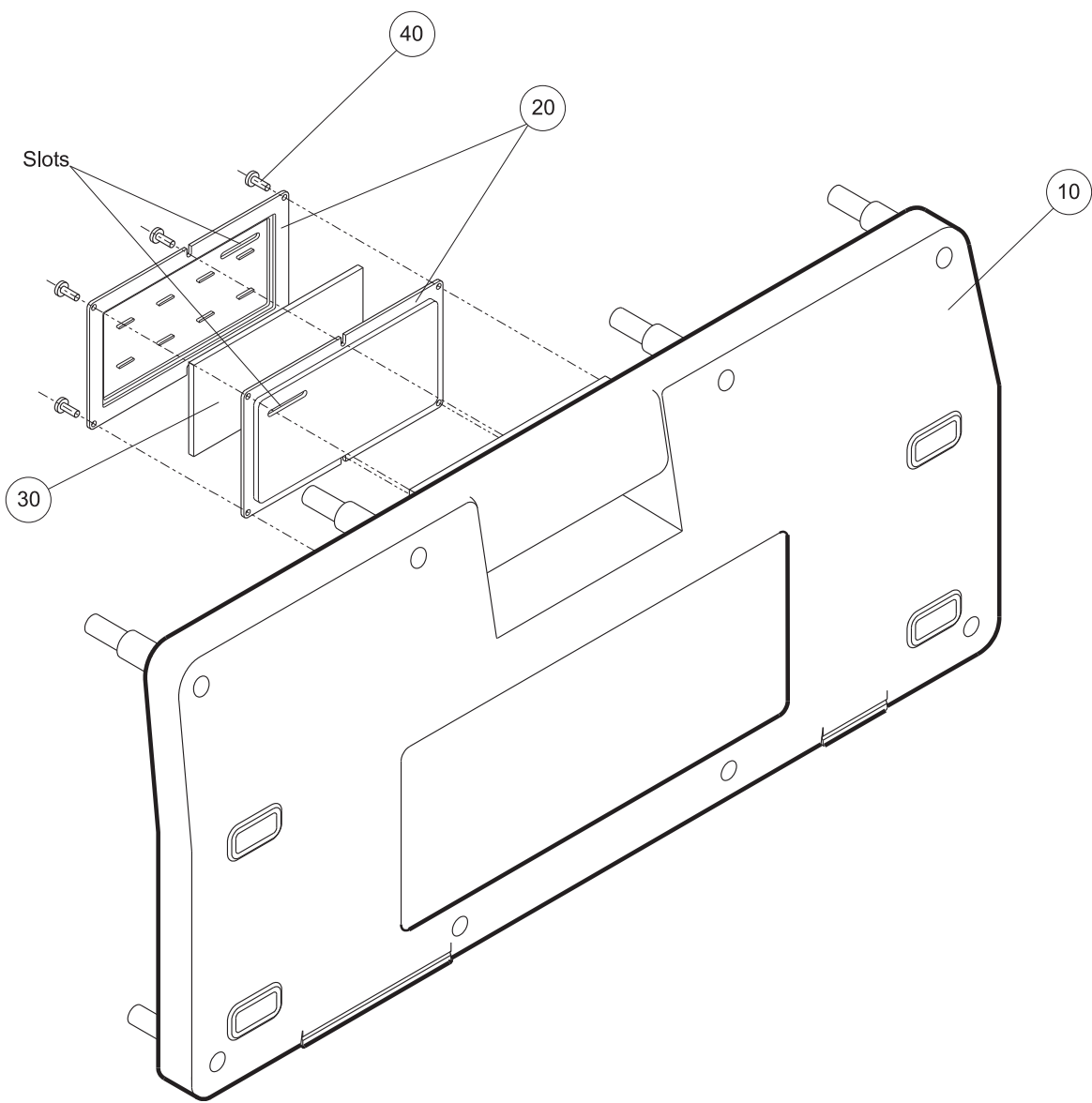


Figure 9 - Pump Filter Assembly

6 Disassembling the Pump Filter

- 6.1 Disassemble the Rear Case (Refer to Chapter 5, Page 33, Section 4).
- 6.2 Lay the Rear Case on a flat surface, remove the six screws (Fig 9, Item 40) and keep them in a safe place.
- 6.3 Remove the Filter Housing Plates (Fig 9, Item 20) and the Filter (Fig 9, Item 30).
- 6.4 Discard the old Filter.

7 Assembling the Pump Filter

- 7.1 Assembly of the new Pump Filter is in the reverse order of disassembly. Make sure the slots in the Filter Housing Plates (Fig 9, Item 20) are uppermost in the positions shown in Figure 9.
- 7.2 Assemble the Rear Case (Refer to Chapter 5, Page 33, Section 5).

Table 8 - Pump Filter Parts List

Item	Part Number	Description	Qty
10	649302	Rear Case	1
20	151311	Filter Housing Plate	2
30	151312	Filter	1
40	FAS179	Pan Head Self Tapping Screw (Dia 2.5mm x 10 mm)	6

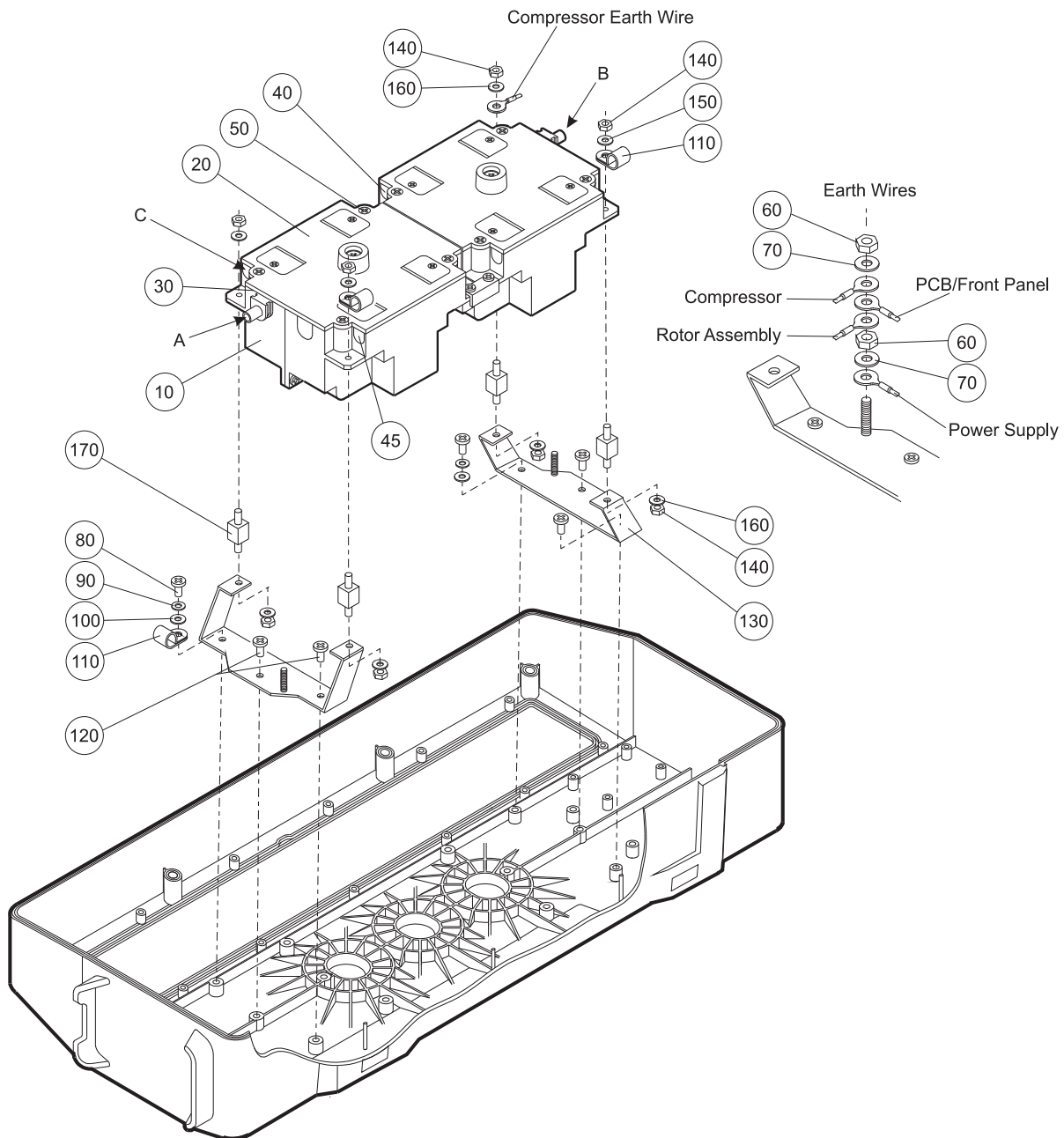


Figure 10 - Remove the Double Compressor Assembly and Disassemble the AV mounts

8 Removing the Double Compressor Assembly

- 8.1 Disassemble the Rear Case (Refer to Chapter 5, Page 33, Section 4).
- 8.2 Remove the screws (Fig 10, Item 50) and the compressor lids (Fig 10, Item 20). Lift the four pairs of power cables, together with the rubber grommets, out from the side of each compressor casing. Make sure the blanking grommets (Fig 10, Item 40) on the inner side of each compressor remain in the compressor casing.
- 8.3 If necessary, replace the items that follow:
 - 8.3.1 The compressor Shuttles (Refer to Chapter 5, Page 44, Section 15).
 - 8.3.2 The compressor Coils (Refer to Chapter 5, Page 44, Section 16).
- 8.4 Disconnect the high pressure switch hose and the compressor hose from the compressor (Figure 10, A and B) and disconnect the silencer bag (Page 64, Fig 23, Item 30) from the compressor hose.
- 8.5 Remove the Bio Filter (Refer to Chapter 5, Page 66, Section 32).
- 8.6 Cut and remove any cable ties as necessary and disconnect the 2 compressor power cables from the PCB.
- 8.7 Remove the items that follow from the left compressor bracket:
 - 8.7.1 Screw (Fig 10, Item 80) and washers (Fig 10, Items 90 and 100).
 - 8.7.2 'P' Clip (Fig 10, Item 110).
- 8.8 Remove the nuts, washers (Fig 10, Items 140 and 160) and the compressor earth wire from the top of the compressor.
- 8.9 Remove the nuts, washers and 'P' clips (Fig 10, Items 140, 150 and 110) together with the compressor hose. The 'P' clips can remain on the hose.
- 8.10 Remove the double compressor assembly (Fig 10, Item 10).

9 Installing the Double Compressor Assembly

- 9.1 Carefully install the double compressor assembly into the pump onto the AV mounts on the compressor brackets in the pump casing.
- 9.2 Install the screw, the washers and the 'P' Clip (Fig 10, Items 80, 90, 100 and 110) to the left compressor bracket. Make sure that the 'P' Clip is around the two of the compressor power cable wires which form the longer loop from point C in Figure 10.
- 9.3 Connect the two compressor power cables to the PCB (Refer to Figure 16).
- 9.4 Attach the high pressure switch hose to the compressor (Figure 10, A) and the silencer bag to the compressor hose (Page 64, Fig 23, Item 30). Attach the compressor hose to the compressor (Figure 10, B).
- 9.5 If necessary, replace the compressor lid gaskets (Figure 10, Item 30) as follows:
 - 9.5.1 Remove the old gasket and clean the compressor lid.
 - 9.5.2 Peel the back off of the new gasket (Figure 10, Item 30) and stick in position on the lid.
- 9.6 Make sure that the blanking grommets (Figure 10, Item 40) are installed in the compressor casings and install the compressor lids (Figure 10, Item 20). Secure the lids with screws (Figure 10, Item 50).
- 9.7 Fit new cable ties where they were removed.
- 9.8 Assemble the rear case (Refer to Chapter 5, Page 33, Section 5).

10 Removing the AV Mounts

- 10.1 Remove the double compressor assembly (Refer to Chapter 5, Page 37, Section 8).
- 10.2 Remove the items that follow from the earthing stud on the right compressor bracket:
 - 10.2.1 The nut and washer (Fig 10, Items 60 and 70).
 - 10.2.2 The four earth wire connectors (Compressor, Front Panel/PCB and Rotary Valve).
 - 10.2.3 The nut, washer (Fig 10, Items 60 and 70) and the Power Supply earth wire connector.
- 10.3 Remove the screws (Fig 10, Item 120) and the left compressor bracket (Fig 10, Item 130) from the pump casing.
- 10.4 Remove the screw and washers (Fig 10, Items 80, 90 and 100) from the right compressor bracket.
- 10.5 Remove the screws (Fig 10, Item 120) and the right compressor bracket from the pump casing.
- 10.6 Remove the nuts, washers and AV mounts (Fig 10, Items 140, 160 and 170) from each compressor bracket.

11 Installing the AV Mounts

- 11.1 Install the AV mounts, the washers and the nuts (Fig 10, Items 170, 160 and 140) to each compressor bracket (Fig 10, Item 130).
 - 11.2 Install the right compressor bracket (with the earth label) into the pump casing. Secure the bracket with a screw and washers (Fig 10, Items 80, 90 and 100) at the back, nearest the PCB.
 - 11.3 Install screws (Fig 10, Item 120) to the remaining holes in the bracket.
 - 11.4 Install the items that follow to the earthing stud on the right compressor bracket:
 - 11.4.1 The Power Supply earth wire connector.
 - 11.4.2 The washer and nut (Fig 10, Items 70 and 60).
 - 11.4.3 The four earth wire connectors (Rotary Valve, Compressor and Front Panel/PCB).
 - 11.4.4 The washer and nut (Fig 10, Items 70 and 60).
 - 11.5 Install the left compressor bracket and secure with the screws (Fig 10, Item 120).
- Note:** *Do not install the screw, washers and 'P' clip to the left compressor bracket at this stage.*
- 11.6 Install the double compressor assembly (Refer to Page 37, Section 9)

Table 9 - Compressor Parts List

Item	Part Number	Description	Qty
10	165076	Double Compressor Assembly - 220V 50Hz (UK, EURO)	1
	165074	Double Compressor Assembly - 120V 60Hz (USA)	
	165095	Double Compressor Assembly - 230V 60Hz (KSA)	
20	165311	Compressor Lid	2
30	165312	Compressor Lid Gasket	2
40	165300	Grommet Blank	4
45	165303	Grommet Blank - Lead through	4
50	FAS177	Screw M4 8mm Torx C'SK Head	8
60	FAS144	Nut M4 Full	2
70	FAS053	Washer M4 Anti-Vib	2
80	FAS093	Screw M4 12mm	2
90	FAS053	Washer M4 Anti-Vib	2
100	FAS160	Washer M4 Plain	2
110	151386	'P' Clip No.6	3
120	FAS095	Screw M4 10mm Pan Head Pozi	4
130	151310	Compressor Mounting Bracket	2
140	FAS178	Nut 8/32 UNC	8
150	FAS160	Washer M4 Plain	6
160	FAS053	Washer M4 Anti-Vib	2
170	151364	AV Mount	4
180	BP196	Cable Tie	A/R

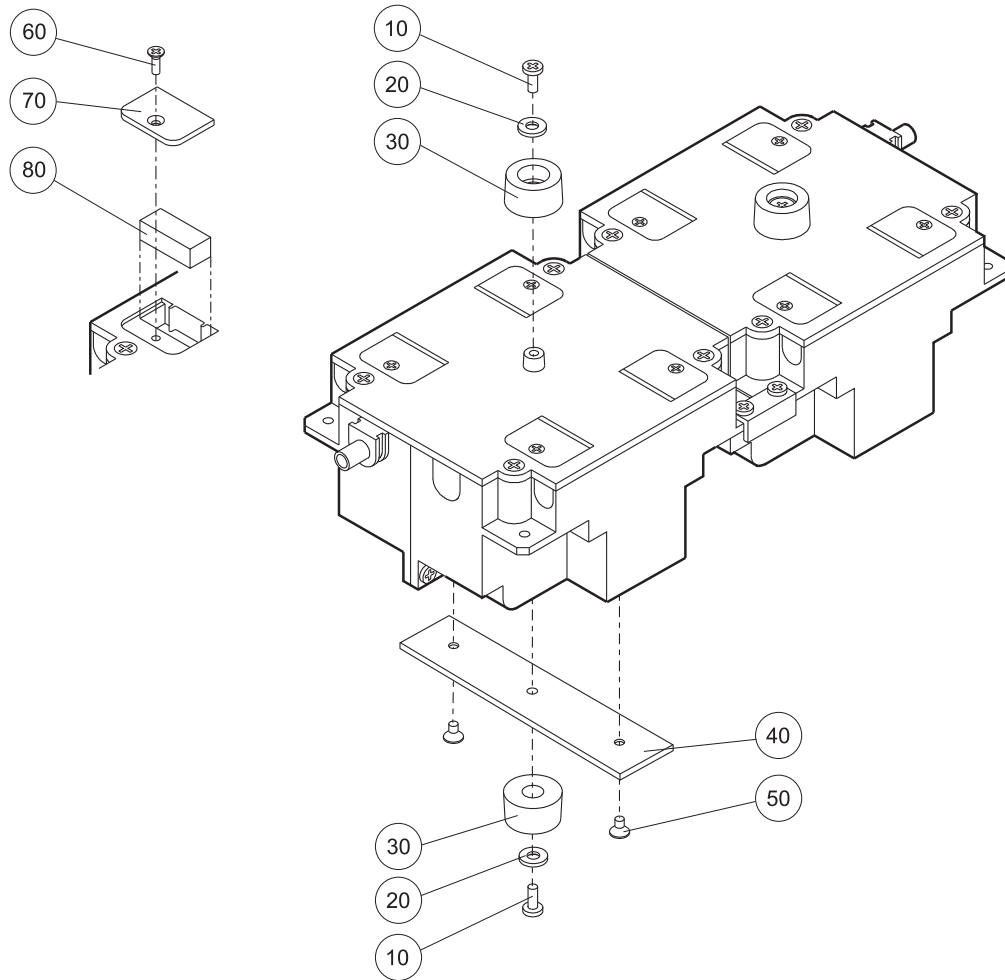


Figure 11 - Replacing the Compressor Bump Stops

Table 10 - Compressor Bump Stops Parts List

Item	Part Number	Description	Qty
10	FAS051	Screw M4 6mm Pan Head	4
20	FAS160	Washer M4 Plain	4
30	165310	Bump Stop	4
40	165324	Bump Stop Plate	2
50	FAS177	Screw M4 8mm Torx C'SK Head	4
60	FAS193	Screw M3 5mm Torx Pan Head	8
70	165314	Filter Lid	8
80	165313	Filter	8

12 Replacing the Compressor Filters

- 12.1 Disassemble the Rear Case (Refer to Chapter 5, Page 33, Section 4).
- 12.2 For each compressor filter (8 in total):
 - 12.2.1 Remove the screw and the compressor filter lid (Fig 11, Items 60 and 70).
 - 12.2.2 Replace the compressor filter (Fig 11, Item 80).
 - 12.2.3 Install the compressor filter lid and the screw (Fig 11, Items 60 and 70).
- 12.3 Assemble the rear case (Refer to Chapter 5, Page 33, Section 5).

13 Removing the Compressor Bump Stops

- 13.1 To remove the Compressor Bump Stops (Fig 11, Item 30) from the top of the compressors:
 - 13.1.1 Disassemble the Rear Case (Refer to Chapter 5, Page 33, Section 4).
 - 13.1.2 Remove the screws, washers and the Bump Stops (Fig 11, Items 10, 20 and 30).
- 13.2 To remove the Compressor Bump Stops (Fig 11, Item 30) from the bottom of the compressors:
 - 13.2.1 Remove the Double Compressor Assembly (Refer to Section 8).
 - 13.2.2 Remove the screws, washers and the Bump Stop (Fig 11, Items 10, 20 and 30).
 - 13.2.3 If necessary, remove the screws and the plate (Fig 11, Items 50 and 40).

14 Installing the Compressor Bump Stops

- 14.1 To install the Compressor Bump Stops (Fig 11, Item 30) from the top of the compressors:
 - 14.1.1 Install the screws, washers and the Bump Stop (Fig 11, Items 10, 20 and 30).
 - 14.1.2 Assemble the rear case (Refer to Chapter 5, Page 33, Section 5).
- 14.2 To install the Compressor Bump Stops (Fig 11, Item 30) from the bottom of the compressors:
 - 14.2.1 If necessary, install the screws and the plate (Fig 11, Items 50 and 40).
 - 14.2.2 Install the screws, washers and the Bump Stops (Fig 11, Items 10, 20 and 30).
 - 14.2.3 Install the Double Compressor Assembly (Refer to Chapter 5, Page 37, Section 9).

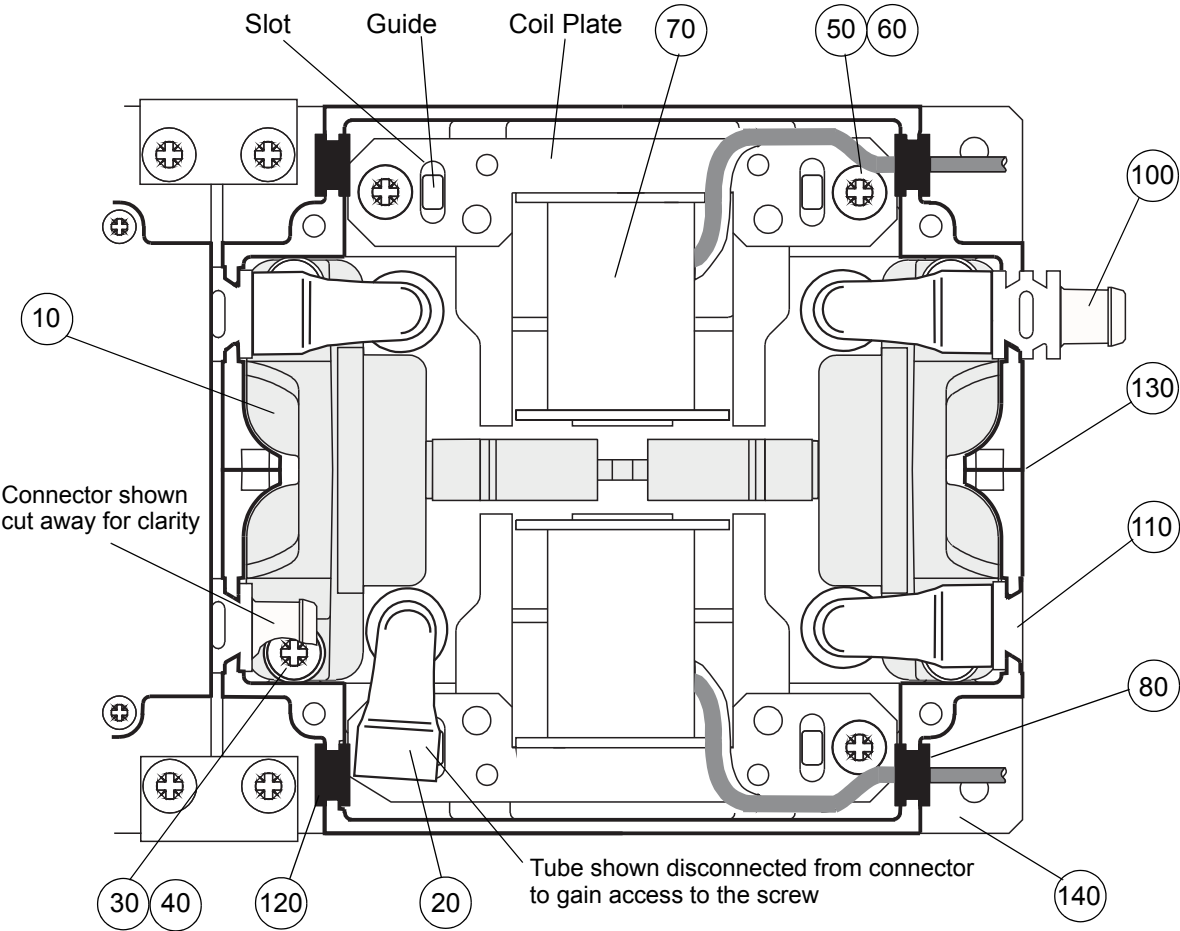


Figure 12 - Replacing the Shuttles and the Coils of the Compressor

Table 11 - Shuttle and Coil Parts List and Special Tool

Item	Part Number	Description	Qty
10	165054	Shuttle 50Hz	2
	165092	Shuttle 60Hz	
20	165306	Tube - Outlet	8
30	FAS176	Screw M4 12mm Pan Head	8
40	FAS207	Washer Disc Spring ID4.2 OD10	8
50	FAS172	Screw M4 10mm Pan Head	8
60	FAS206	Washer Belleville Serrated Safety	8
70	165058	Coil (pair) (UK, EURO)	2
	165107	Coil (pair) (USA)	
	REF	Coil (pair) (KSA)	
80	165303	Grommet lead-through	4
90	MIS155	Service Tool (not shown) Spacer saddle gauge set (5 gauges A to E)	1
100	165301	Connector - Outlet tube	4
110	165302	Plug - Outlet tube	2
120	165300	Grommet - Blank	4
130	165305	Compressor Casting Half Centre Seal	2
140	165304	Compressor Casting Half	4

15 Replacing the Shuttle Assemblies

- 15.1 Disassemble the Rear Case (Refer to Chapter 5, Page 33, Section 4).
- 15.2 Remove the screws (Fig 10, Item 50) and the compressor lids (Fig 10, Item 20). Make sure the blanking grommets remain in the compressor casing.
- 15.3 Remove each shuttle assembly as follows:
 - 15.3.1 Using a flat head screwdriver, carefully prise each tube (Fig 12, Item 20) off of its connector and remove the connectors.
 - 15.3.2 Remove the screws and washers (Fig 12, Items 30 and 40) from the shuttles Fig 12, Item 10).
 - 15.3.3 Remove and discard the shuttles (Fig 12, Item 10) from the compressor. Make sure the small O-rings in the base of the shuttle are removed with the shuttle.
- 15.4 Install each shuttle assembly as follows:
 - 15.4.1 Ensure the O-rings are in the bottom of the shuttles and install the new shuttles (Fig 12, Item 10) into the compressor. Install and tighten the screws and washers (Fig 12, Items 30 and 40) to secure each shuttle in position and refit the connectors.
 - 15.4.2 Push each tube (Fig 12, Item 20) fully onto its connector.
- 15.5 Install the compressor lids (Fig 10, Item 20) and secure with screws (Fig 10, Item 50).
- 15.6 Assemble the rear case (Refer to Chapter 5, Page 33, Section 5).

16 Replacing the Coil Assemblies

- 16.1 Disassemble the Rear Case (Refer to Chapter 5, Page 33, Section 4).
 - 16.2 Remove the screws (Fig 10, Item 30) and the relevant compressor lid (Fig 10, Item 20). Make sure the blanking grommets remain in the compressor casing.
 - 16.3 Disconnect the power cables of the coil assemblies (Fig 12, Item 70) from the PCB display board. Lift the grommets (Fig 12, Item 80), holding the power cables, out of the slots in the compressor.
 - 16.4 If the coils are being removed from the compressor at the 5-way connector end of the pump, remove the screw, washers and 'P' clip (Fig 10, Items 80, 90, 100 and 110) from the compressor bracket.
 - 16.5 Remove the screws and washers (Fig 12, Items 50 and 60) from the coils.
 - 16.6 Lift the coils (Fig 12, Item 70) out of the compressor.
 - 16.7 Install the new coils into the compressor, locating the guides in the slots of the coil plates.
 - 16.8 Loosely install the screws and washers (Fig 12, Items 50 and 60).
 - 16.9 Move both coils away from the shuttle and carefully place the appropriate saddle gauge over the shuttle magnet, in between the coils (Fig 12, Item 70).
- Note:** *The spacer saddle gauge set (Item 90) comprises 5 saddle gauges. The gauges provide adjustment in steps of 0.5 litres/minute with gauge A giving maximum air flow and gauge E giving minimum air flow.*
- 16.10 Move the coils such that they rest against the setting tool. Make sure the coils are square to the tool and are centrally disposed in the compressor.
 - 16.11 Without moving the coils, tighten the screws (Fig 12, Item 50).
 - 16.12 Remove the setting tool.
 - 16.13 Install the grommets (Fig 12, Item 80) into the slots in the compressor and connect the power cables to the PCB display board.

- 16.14 Connect the hose to the compressor (The hose that leads from the silencer bag or the hose from the high pressure switch, depending on the compressor).
- 16.15 If the coils are being installed to the compressor at the 5-way connector end of the pump, install the screw, the washers and the 'P' Clip (Fig 10, Items 80, 90, 100 and 110) to the other bracket. Make sure that the 'P' Clip is around 2 of the compressor power cable wires which form the longer loop.
- 16.16 Make sure that the blanking grommets are installed in the compressor casing and install the compressor lid (Fig 10, Item 20). Secure the lid with screws (Fig 10, Item 30).
- 16.17 Assemble the rear case (Refer to Chapter 5, Page 33, Section 5).

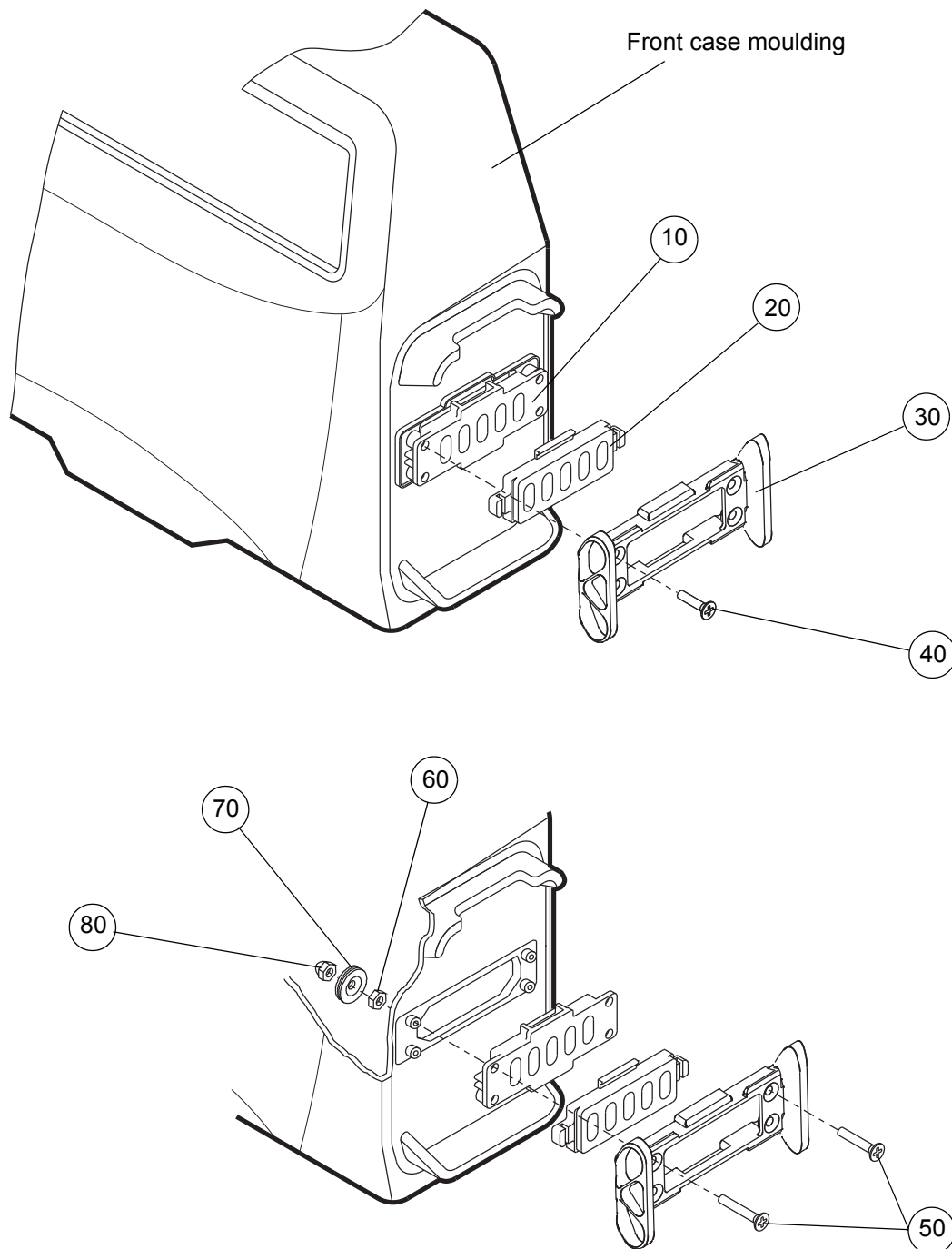


Figure 13 - Replacing the Manifold Gasket

17 Replacing the Manifold Gasket

- 17.1 Remove the manifold screws (Fig 13, Item 40).
- 17.2 Remove the manifold outer (Fig 13, Item 30) and the manifold gasket (Fig 13, Item 20). The manifold inner (Fig 13, Item 10) will remain connected to the tubes inside the pump.
- 17.3 Install the new manifold gasket (Fig 13, Item 20), the manifold outer (Fig 13, Item 30) and the screws (Fig 13, Item 40).

Table 12 - Manifold Parts List

Item	Part Number	Description	Qty
10	151480	Manifold 5 Way Barbed	1
20	151304	5 Way Manifold Gasket	1
30	151471	Connector Manifold Braced Blue	1
40	FAS233	Screw M3 x 16mm Pozi C'SK Head	4
50	FAS196	Screw M3 x 25mm C'SK Head	4
60	FAS098	Nut M3 Full	4
70	VIB004	Grommet	4
80	197312	Nut M3 Domed Plastic	4

- 17.4 If the screws will not tighten and the threads in the case have been stripped, repair the manifold as follows:

- 17.4.1 Disassemble the Rear Case (Refer to Section 4).
- 17.4.2 Remove the manifold screws, the manifold outer and the manifold gasket (Fig 13, Items 40, 30, 20).
- 17.4.3 Disconnect the four tubes from the manifold inner (Fig 13, Item 10).

CAUTION: Do not damage the tubes and other components inside the pump when drilling the case.

- 17.4.4 Using a 3.2 mm drill, carefully drill through the bosses of the casing in the positions of the screw holes. Clean the holes and ensure no swarf remains in the pump.
- 17.4.5 Position the manifold inner on the outside of the case.
- 17.4.6 Press the nuts (Fig 13, Item 60) into the vibration grommets (Fig 13, Item 70).
- 17.4.7 Assemble the manifold gasket (Fig 13, Item 20), the manifold outer (Fig 13, Item 30) to the case.
- 17.4.8 Install bolts (Fig 13, Item 50) into the four holes.
- 17.4.9 Install the vibration grommets and the nuts (Fig 13, Items 60 and 70) and the domed nuts (Fig 13, Item 80). Tighten the nuts to secure the manifold to the case.
- 17.4.10 Connect the four tubes to the inside of the manifold (Refer to Figure 23).
- 17.4.11 Assemble the rear case (Refer to Chapter 5, Page 33, Section 5).

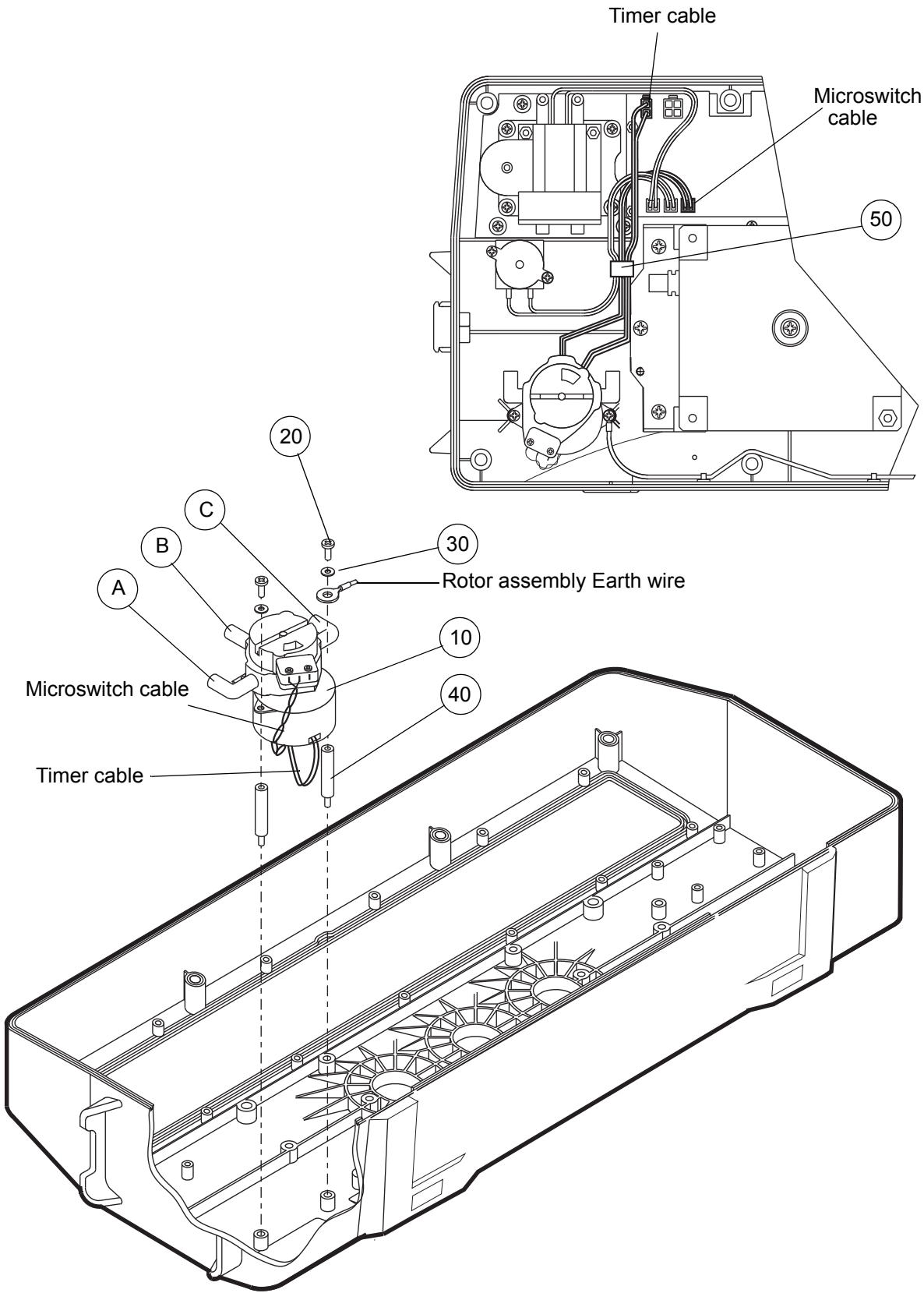


Figure 14 - Replacing the Rotor Assembly

18 Removing the Rotary Valve Assembly

- 18.1 Disassemble the Rear Case (Refer to Chapter 5, Page 33, Section 4).
- 18.2 Using a small flat head screwdriver, carefully prise the hoses off the rotary valve assembly at connections A, B and C.
- 18.3 Disconnect the microswitch and timer cables from the PCB display board.
- 18.4 Carefully remove the cable tie (Fig 14, Item 50) holding the three cables.
- 18.5 Remove the screws (Fig 14, Item 20), the washers (Fig 14, Item 30) and the earth wire from the rotary valve assembly (Fig 14, Item 10).
- 18.6 Remove the rotary valve assembly (Fig 14, Item 10) from the pump case.
- 18.7 If the pillars (Fig 14, Item 40) are damaged then replace as necessary.

19 Installing the Rotary Valve Assembly

- 19.1 If necessary, install the pillars (Fig 14, Item 40) into the pump case.
- 19.2 Install the rotary valve assembly (Fig 14, Item 10) onto the pillars (Fig 14, Item 40). Make sure the microswitch and timer cables lead underneath the rotary valve assembly, between the pillars.
- 19.3 Install the screws (Fig 14, Item 20), washers (Fig 14, Item 30) and the rotary valve assembly earth wire. Tighten the screws to secure the rotary valve assembly.
- 19.4 Connect the microswitch and timer cables to the PCB display board and cable tie the wires as shown in Figure 14. Install a cable tie (Fig 14, Item 50) around the microswitch, timer and sensor cables as shown.
- 19.5 Connect the hoses to the tubes A, B and C on the rotary valve assembly (Fig 14, Item 10).

Note: Figure 23 shows the full configuration of the hoses.

- 19.6 Assemble the rear case (Refer to Chapter 5, Page 33, Section 5).

Table 13 - Rotary Valve Assembly Parts List

Item	Part Number	Description	Qty
10	151128	Rotary Valve Assembly (UK, EURO 50Hz)	1
	151155	Rotary Valve Assembly (USA 60Hz)	
20	FAS043	Screw M3 x 6 Pan Head	2
30	FAS002	Washer 6BA Anti-Vib	2
40	151348	Pillar M3 x 30 mm	2
50	BP196	Cable Tie	A/R

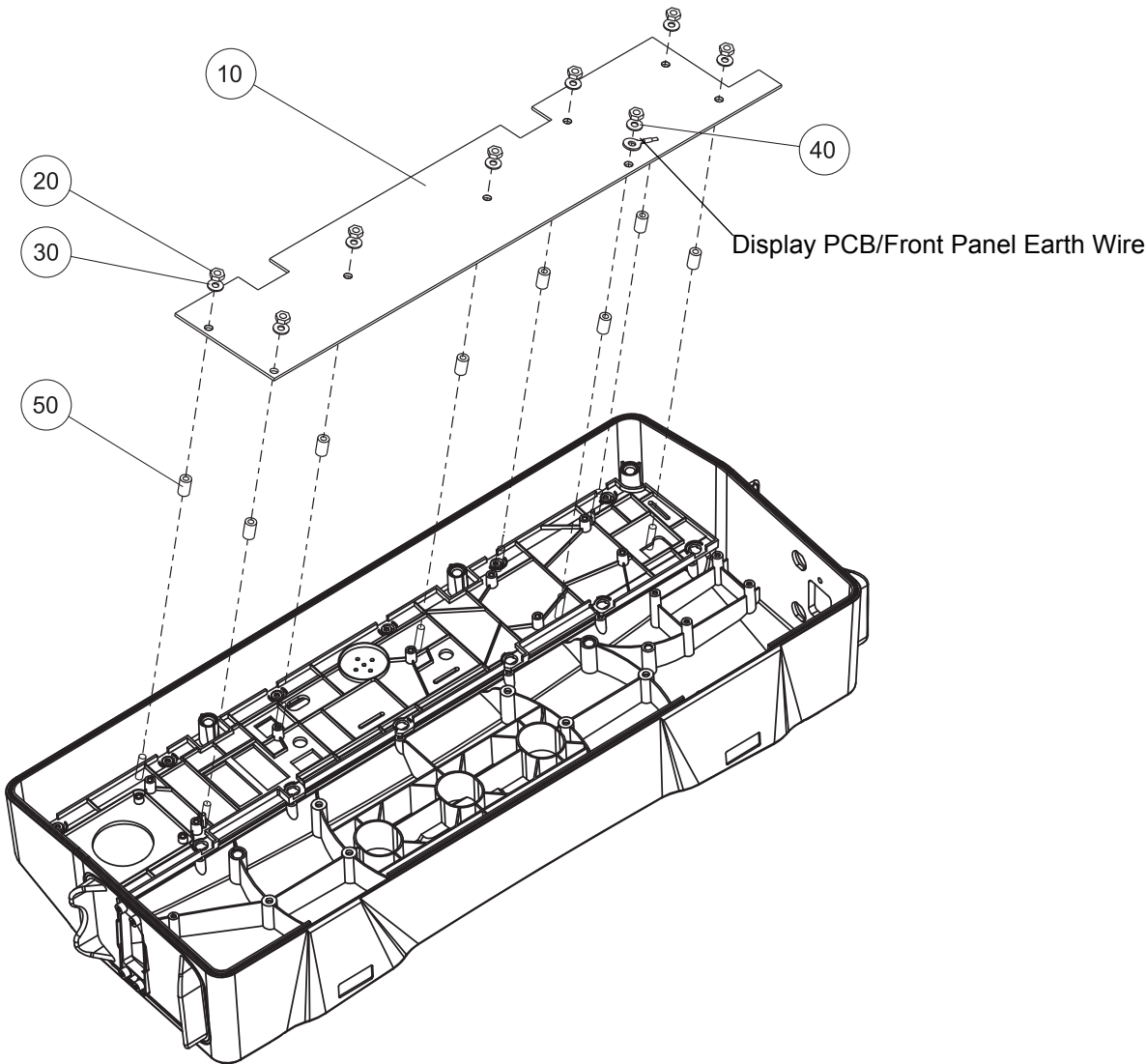


Figure 15 - Replacing the Display PCB

Table 14 - Display PCB Parts List

Item	Part Number	Description	Qty
10	151550/649306	Display Board PCB 240V (UK, EURO)	1
	151549/649305	Display Board PCB 120V (USA 60Hz)	
20	FAS098	Nut M3 Full	8
30	FAS091	Washer M3 Nylon	7
40	FAS002	Washer 6BA Anti-Vib	1
50	151352	Spacer 8.5LG x 3.2 x 6mm	8

20 Removing the Display PCB

- 20.1 Disassemble the Rear Case (Refer to Chapter 5, Page 33, Section 4).
- 20.2 Cut and remove any cable ties as necessary and disconnect the wires as follows:
 - 20.2.1 Rotary Assembly Motor
 - 20.2.2 Compressor Power Cable
 - 20.2.3 Pressure Control Micro-switch -Low Pressure (LP)
 - 20.2.4 Pressure Switch -High Pressure (HP)
 - 20.2.5 Rotary Assembly Micro-switch (Cycle)
 - 20.2.6 Compressor Power Cable
 - 20.2.7 Power Switch to Display Panel PCB (bottom)
 - 20.2.8 Power Switch to Display Panel PCB (top)
 - 20.2.9 Power Switch to Power Supply Fuses
 - 20.2.10 Display PCB/Front Panel Earth wire

21 Installing the Display PCB Assembly

- 21.1 Install spacers (Fig 15, Item 50) and display board PCB (Fig 15, Item 10) onto the front panel.
- 21.2 Install the display PCB/front panel earth wire on to the correct stud and secure with a nut and washer (Fig 15, Items 20 and 40).
- 21.3 Install the remaining nuts and plastic washers (Fig 15, Items 20 and 30).
- 21.4 Install the Pressure Control Assembly (Refer to Chapter 5, Page 61, Section 28).
- 21.5 Push the Power Switch through the Front Panel ensuring that the circle on the front of the switch is uppermost on the panel.
- 21.6 Refer to Figure 16 or Figure 17 and connect the wires to the display board PCB as follows:
 - 21.6.1 Rotary Assembly Motor
 - 21.6.2 Compressor Power Cable
 - 21.6.3 Pressure Control Micro-switch -Low Pressure (LP)
 - 21.6.4 Pressure Switch -High Pressure (HP)
 - 21.6.5 Rotary Assembly Micro-switch (Cycle)
 - 21.6.6 Compressor Power Cable
 - 21.6.7 Power switch to Display Panel PCB (bottom)
 - 21.6.8 Power switch to Display Panel PCB (top)
 - 21.6.9 Power Supply Fuses to Power switch
- 21.7 Fit cable ties to the following groups of wires:
 - 21.7.1 Cables 1,4 & 5 - Rotary Assembly Motor, Pressure Switch -High Pressure (HP) and Rotary Assembly Micro-switch (Cycle).
 - 21.7.2 Cables 6 & 7 - Compressor Power Cable, Power switch to Display Panel PCB (bottom).
 - 21.7.3 Cable 9 - Power Supply Fuses to Power switch and the filter hose.
 - 21.7.4 Assemble the rear case (Refer to Chapter 5, Page 33, Section 5)

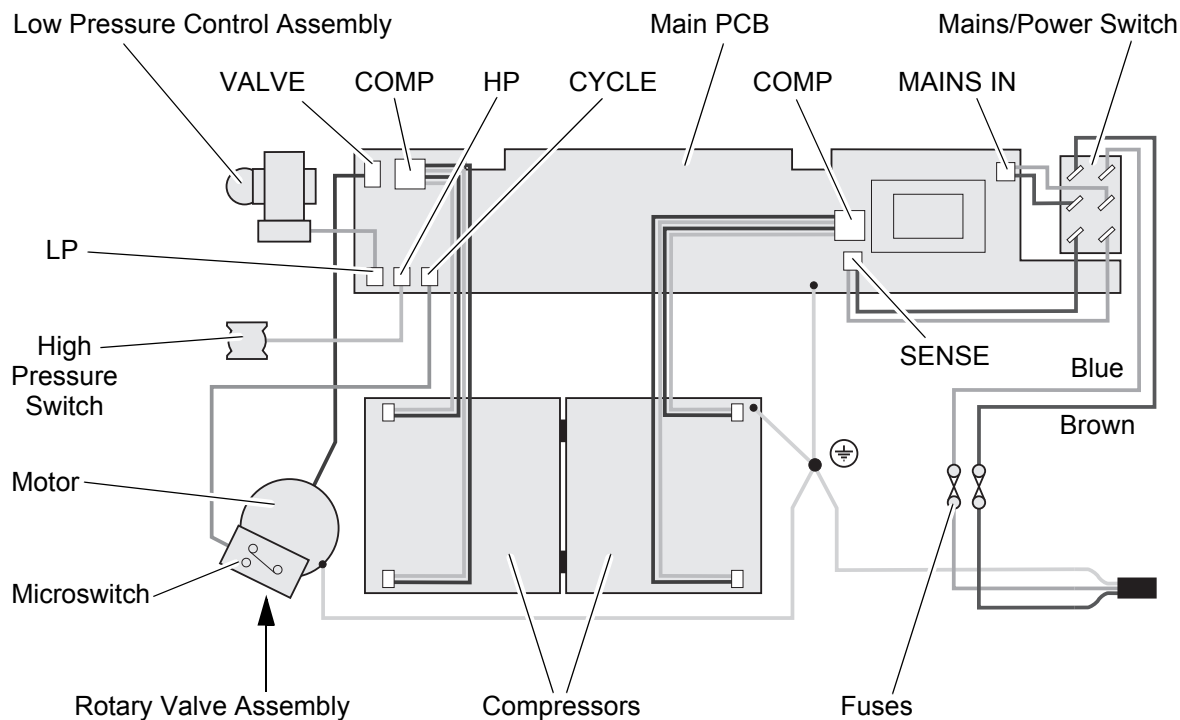


Figure 16 - Circuit Diagram - All variants (except USA)

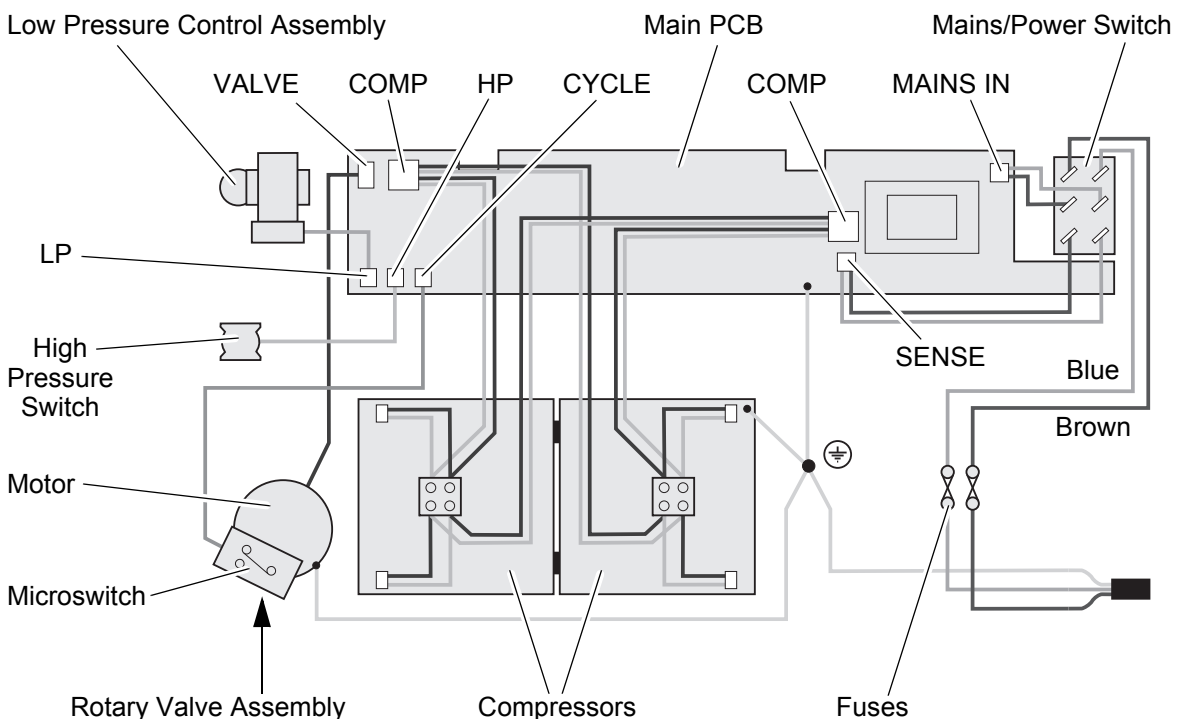


Figure 17 - Circuit Diagram - USA only

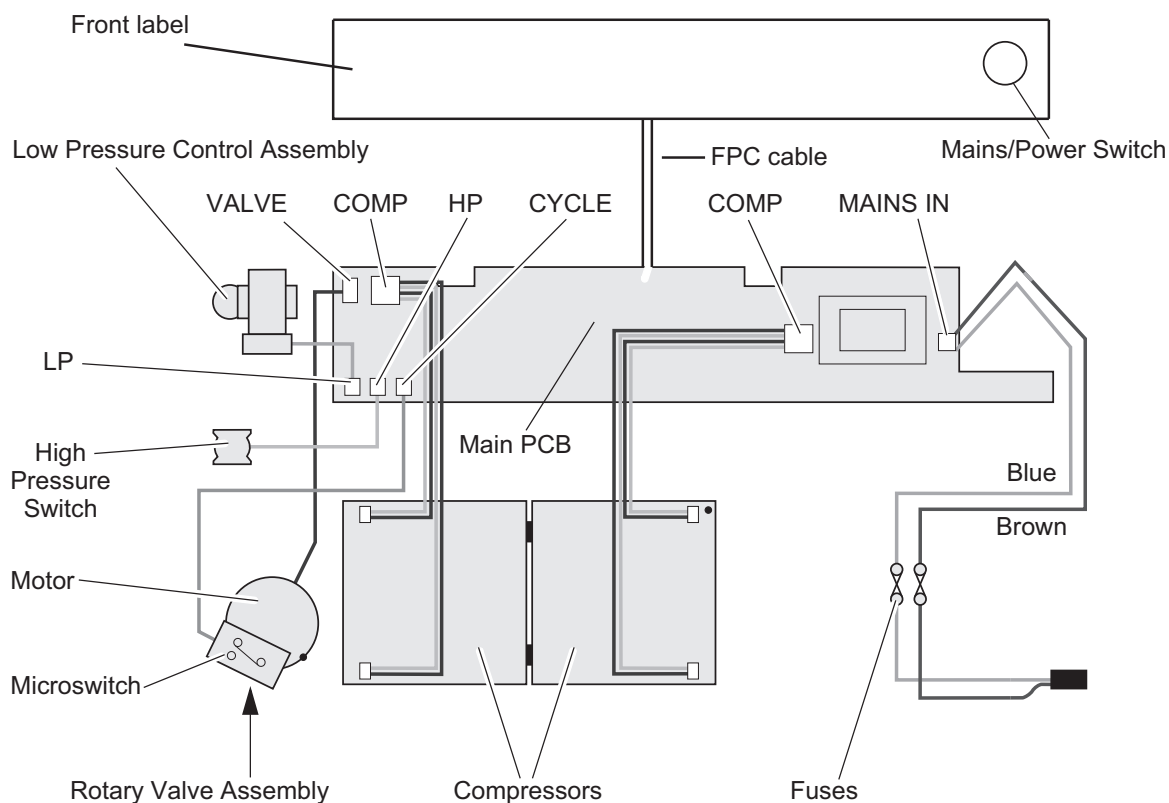


Figure 16(a) - Circuit Diagram - All variants (except USA)

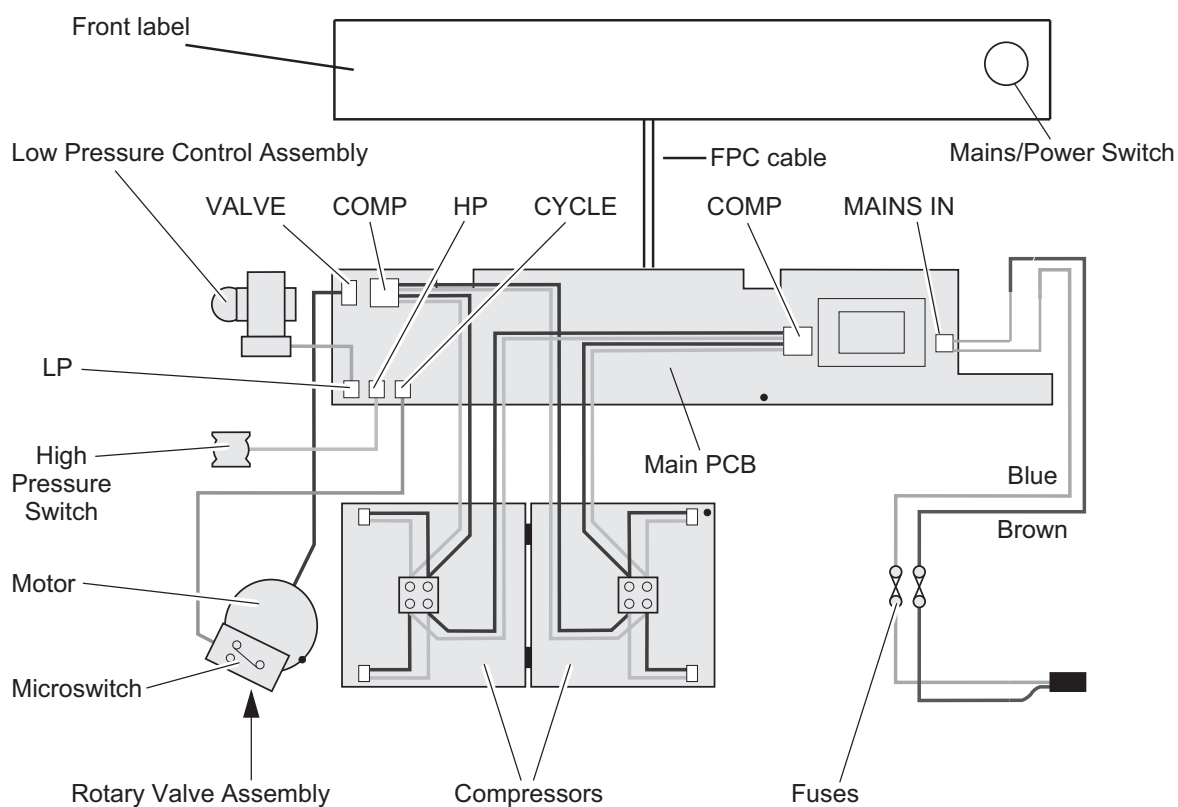


Figure 17(a) - Circuit Diagram - USA only

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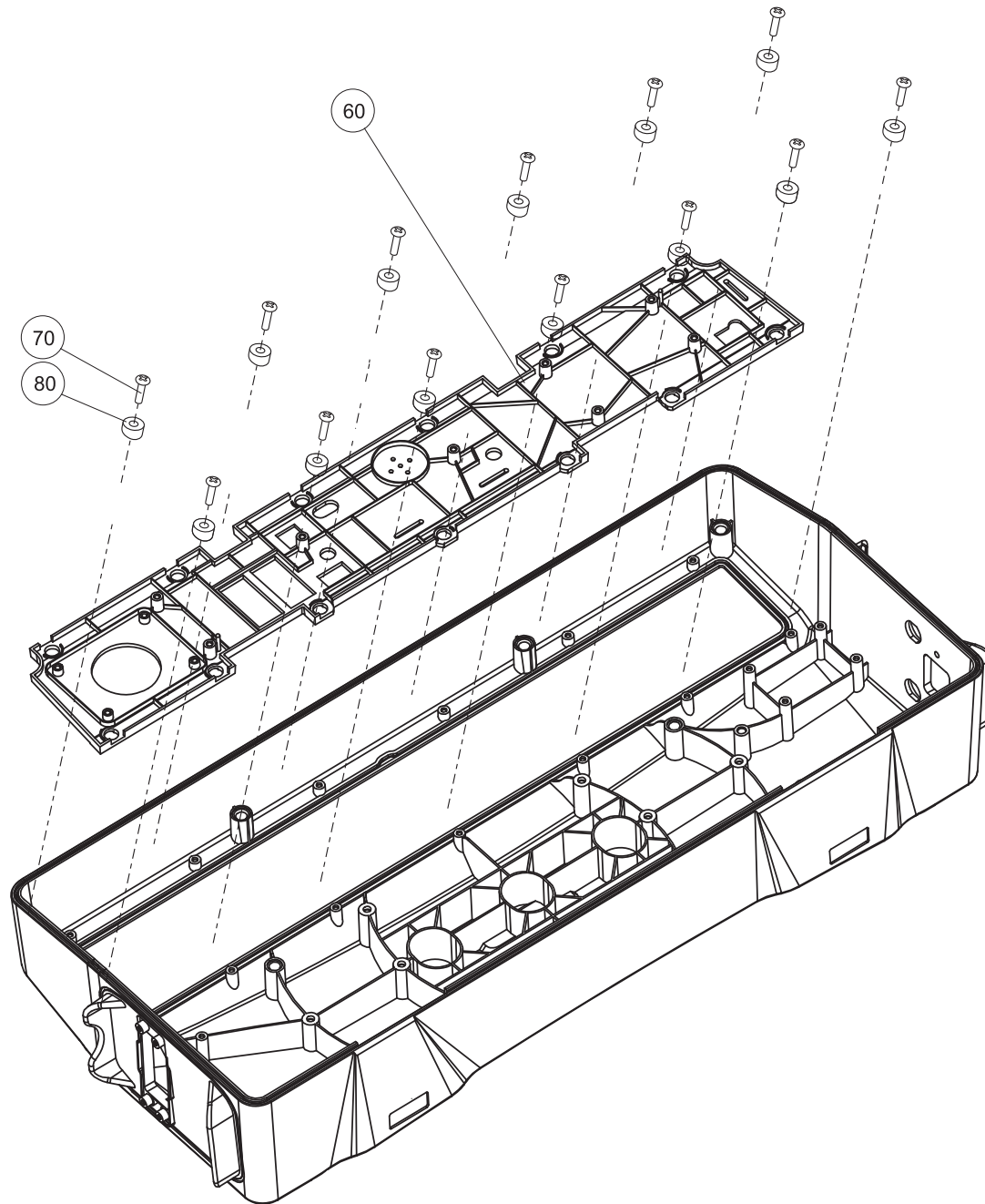


Figure 18 - Replacing the Front Panel

22 Removing the Front Panel

- 22.1 Disassemble the Rear Case (Refer to Chapter 5, Page 33, Section 4).
- 22.2 Remove display PCB (Refer to Chapter 5, Page 50, Section 20).
- 22.3 Remove the spacers (Fig 15, Item 40, 50 and 60) from the Display Board PCB (Fig 15, Item 30).
- 22.4 Remove the Pressure Control Assembly (Refer to Chapter 5, Page 61, Section 27).
- 22.5 Remove the middle screw from each compressor bracket and slacken the remaining screws, such that the compressor assemblies can move away from the front panel.

- 22.6 Remove the screws and fixing caps (Fig 18, Items 70 and 80) and then remove the Front Panel (Fig 18, Item 80).
- 22.7 Push the spring clips of the Power Switch in and remove it from the Front Panel.

23 Installing the Front Panel (if required)

- 23.1 Install the Front Panel (Fig 18, Item 60) and secure with screws and fixing caps (Fig 18, Items 70 and 80).
- 23.2 Fit the middle screw to each compressor bracket and ensure all screws are tightened.
- 23.3 Fit the Pressure Control Assembly (Refer to Chapter 5, Page 61, Section 28).
- 23.4 Fit the spacers (Fig 15, Item 40, 50 and 60).
- 23.5 Fit the Display PCB (Refer to Chapter 5, Page 50, Section 21).
- 23.6 Assemble the Rear Case (Refer to Chapter 5, Page 33, Section 5).

Table 15 - Front Panel Parts List

Item	Part Number	Description	Qty
60	649601	Front Panel Assy (All variants)	1
	151105	Seal Ring	1
70	FAS145	Screw 3 DIA 8 Pozi Pan Head PT	13
80	151309	Front Panel Fixing Cap	13

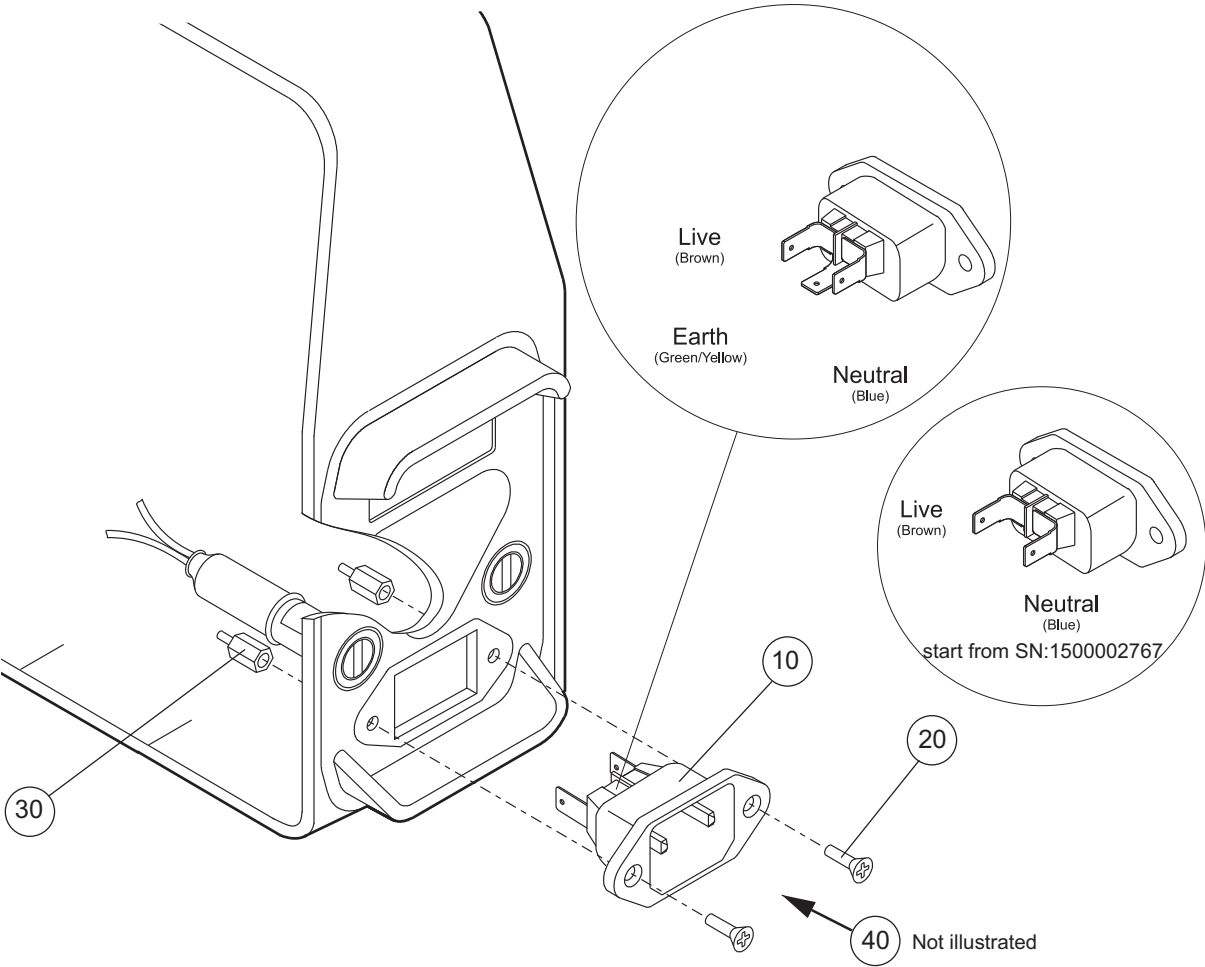


Figure 19 - Replacing the Mains/Power Inlet Socket

Table 16 - Mains/Power Inlet Socket and Cordset Parts List

Item	Part Number	Description	Qty
10	151580 649319	Mains/Power Inlet Socket Start from SN: 1500002767	1
20	FAS346	Screw	2
30	151348	Pillar	2
40	CAB303 CAB303HC	Mains/Power Cable (Euro, Dutch, French, German, Italian, KSA) Start from SN: 1500002767	1
	CAB305 CAB305HC	Mains/Power Cable (UK) Start from SN: 1500002767	
	CAB306 CAB306HC	Mains/Power Cable (USA) Start from SN: 1500002767	
	CAB307 CAB307HC	Mains/Power Cable (Australian) Start from SN: 1500002767	
	CAB308	Mains/Power Cable (Swiss)	

24 Replacing the Mains/Power Inlet Socket and Cordset

24.1 Disassemble the Rear Case (Refer to Chapter 5, Page 33, Section 4).

Note: *The Bio Filter can be removed to gain easier access to the Fuse Holders (Refer to Chapter 5, Page 66, Section 32).*

24.2 Disconnect the two fuses and the earth wire from the back of the Mains/Power Inlet Socket.

24.3 Remove the screws (Fig 19, Item 20), the pillars (Fig 19, Item 30) and the Mains/Power Inlet Socket (Fig 19, Item 10) from the pump casing.

24.4 Install the Mains/Power Inlet Socket (Fig 19, Item 10) into the pump casing ensuring that the 2 connectors are uppermost.

24.5 Install the screws (Fig 19, Item 20) and the pillars (Fig 19, Item 30).

24.6 Connect the two fuses and the earth wire from the back of the Mains/Power Inlet Socket.

Note: *If the Bio Filter has been removed, install the Bio Filter (Refer to Page 66, Section 33).*

24.7 Assemble the rear case (Refer to Chapter 5, Page 33, Section 5).

24.8 If necessary, replace the cordset. (Refer to Table 16, Item 40 for details of cable type).

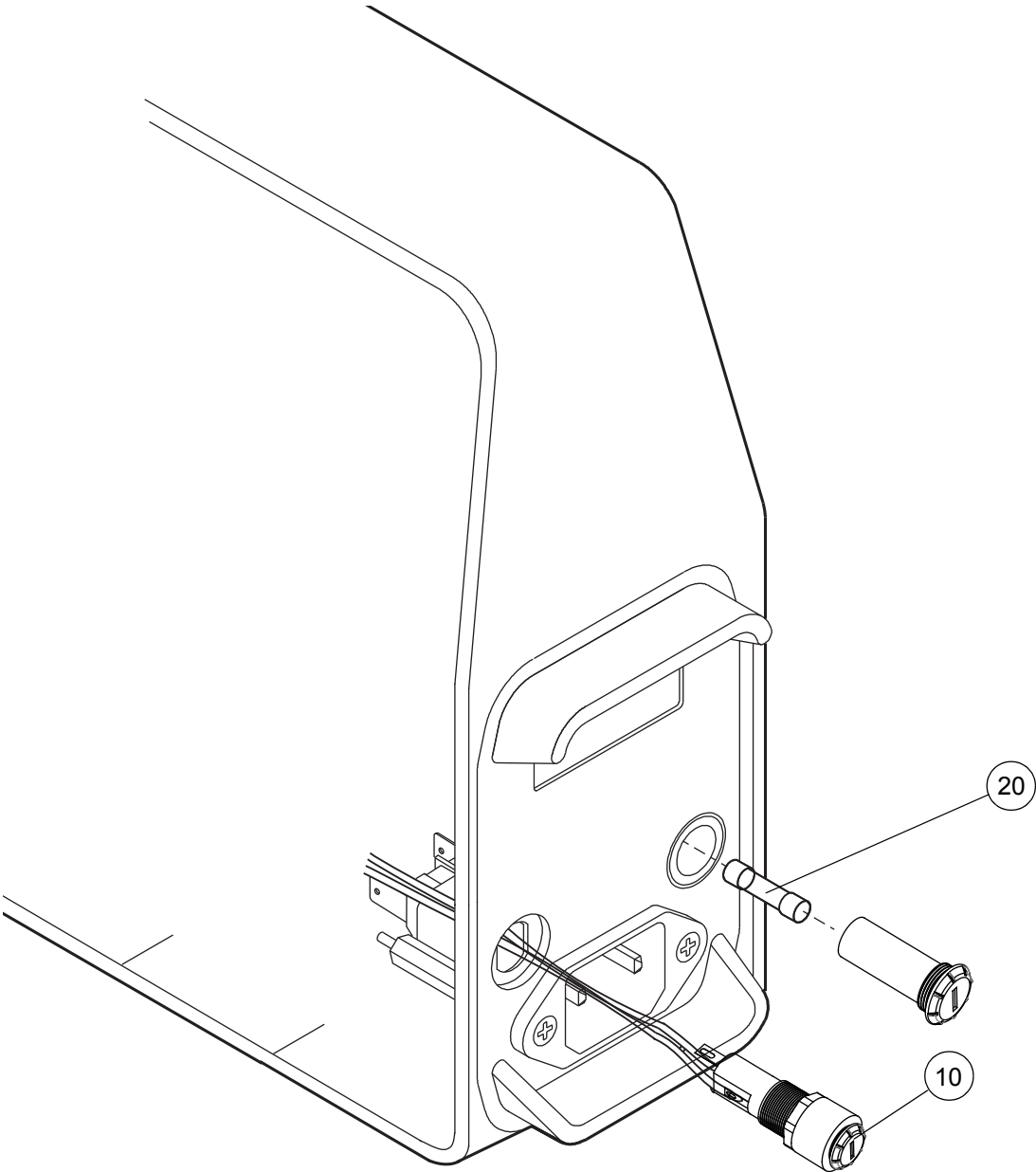


Figure 20 - Replacing the Mains/Power Inlet Fuses and the Fuse Holders

Table 17 - Mains/Power Inlet Fuses and Fuse Holders Part List

Item	Part Number	Description	Qty
10	BP605	Fuse Holder - Neutral (Black)	1
20	CAS024	Fuse F500mA H	2

25 Replacing the Mains/Power Fuses

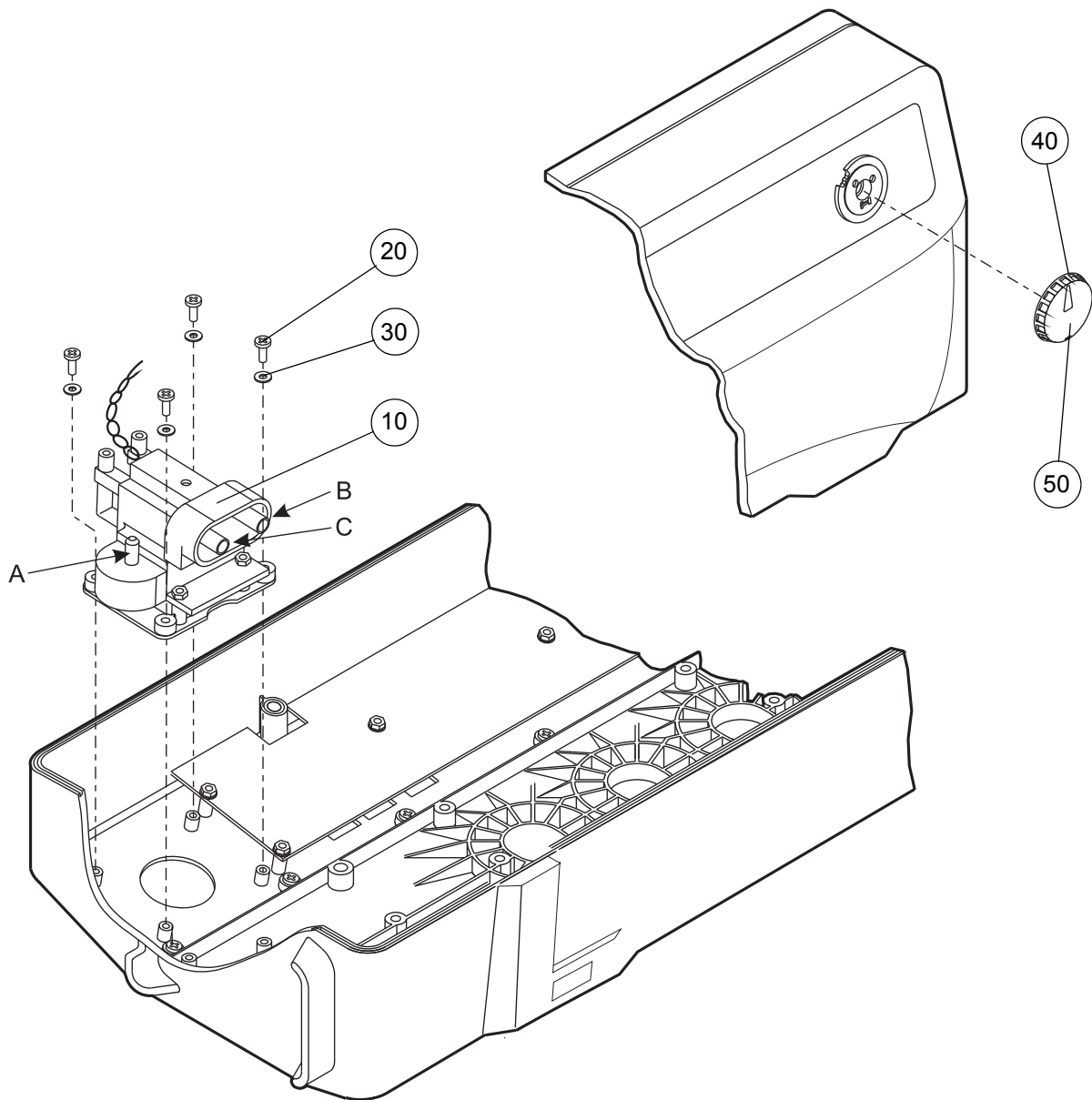
WARNING: BEFORE REPLACING THE MAINS/POWER FUSES, ENSURE THE PUMP UNIT HAS BEEN ISOLATED FROM THE MAINS/POWER SUPPLY BY REMOVING THE MAINS/POWER PLUG FROM THE WALL SOCKET.

- 25.1 Unscrew the Fuse Holder Inner and remove the Fuse (Fig 20, Item 30).
- 25.2 Install the Fuse (Fig 20, Item 30) into the Fuse Holder Inner and screw into the Fuse Holder.

26 Replacing the Mains/Power Inlet Fuse Holders

WARNING: BEFORE REPLACING THE MAINS/POWER FUSEHOLDERS, ENSURE THE PUMP UNIT HAS BEEN ISOLATED FROM THE MAINS/POWER SUPPLY BY REMOVING THE MAINS/POWER PLUG FROM THE WALL SOCKET.

- 26.1 Disassemble the Rear Case (Refer to Chapter 5, Page 33, Section 4).
- Note:** *The Bio Filter can be removed to gain easier access to the Fuse Holders (Refer to Chapter 5, Page 66, Section 32).*
- 26.2 Disconnect the two wires leading from the fuse holder at the Power Switch and the Mains/Power Inlet Socket. Cut and remove any cable ties, as necessary.
- 26.3 On the inside of the pump casing, pull the Fuse Holder Cover off of back the Fuse Holder (Fig 20, Item 10 or 20).
- 26.4 Clamp the triangular flaps on the Fuse Holder (Fig 20, Item 10 or 20) and ease it out of the pump casing.
- 26.5 Ease the Fuse Holder Cover through the hole in the pump casing and remove the Fuse Holder (Fig 20, Item 10 or 20).
- 26.6 Feed the wires of the new Fuse Holder through the hole in pump casing from the outside.
- 26.7 Pull the cover off the back of the Fuse Holder and ease it through the hole.
- 26.8 Pass the back of the Fuse Holder through the hole and push the cover over the back of the Fuse Holder. Ensure the unused connector on the Fuse Holder is inside the cover.
- 26.9 Align the flat edges of the Fuse Holder with those of the hole in the casing and push the Fuse Holder into the hole until it clips into place.
- 26.10 Connect the shortest wire to the correct connector on the back of the Mains/Power Inlet Socket and the longest wire to the correct connector on the Power Switch.
- Note:** *If the Bio Filter has been removed, install the Bio Filter (Refer to Chapter 5, Page 66, Section 33).*
- 26.11 Cable tie the wires, as necessary.
- 26.12 Assemble the rear case (Refer to Chapter 5, Page 33, Section 5).

**Figure 21 - Replacing The Pressure Control Assembly****Table 18 - Pressure Control Assembly Parts List**

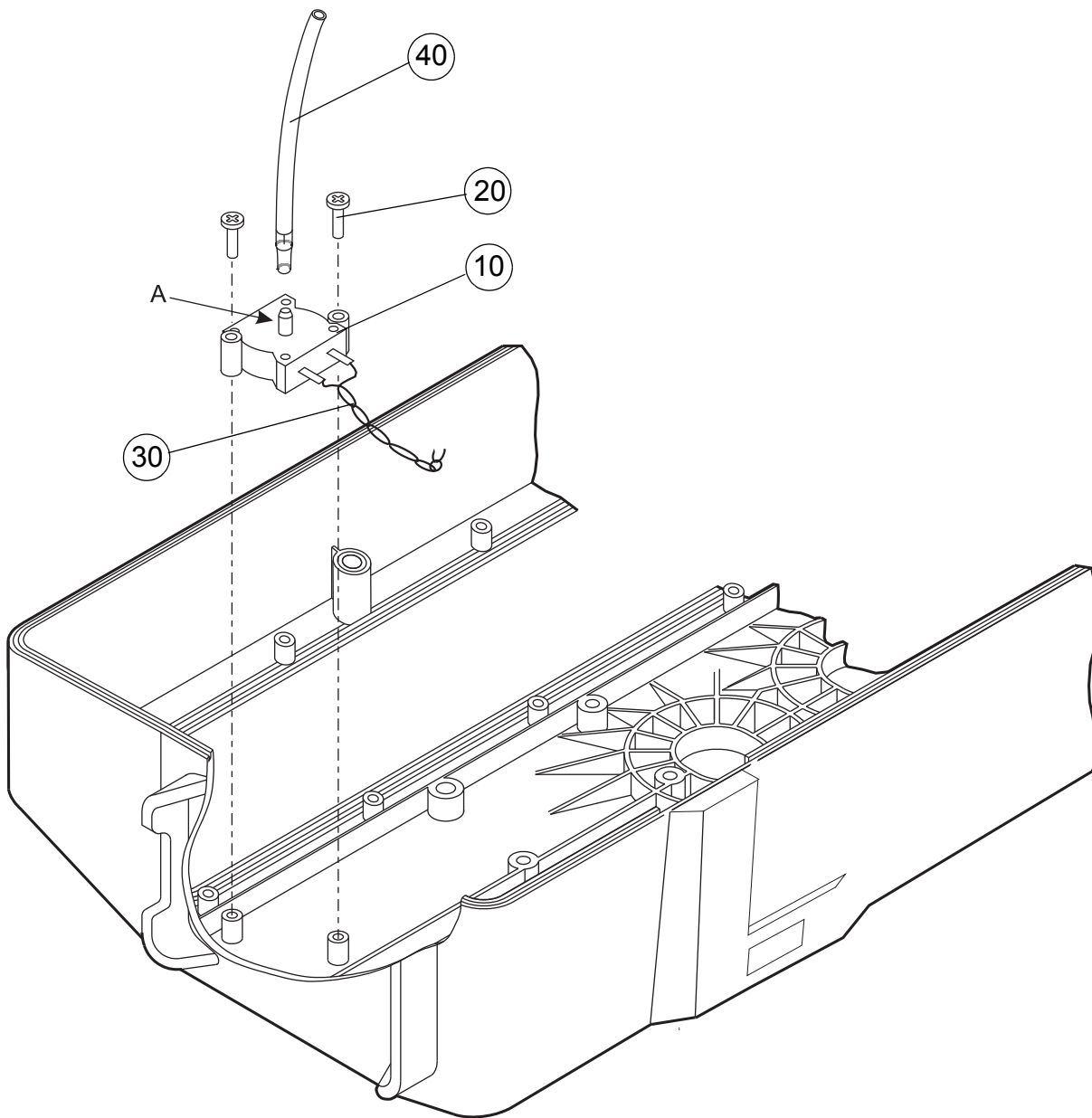
Item	Part Number	Description	Qty
10	151059	Pressure Control Assembly	1
20	FAS043	Screw M3 x 6 Pan Head	4
30	FAS002	Washer 6BA	4
40	151305	Control Knob	1
50	649327	Control Knob Label	1
60	REF	Pressure Control Assembly cable	1

27 Removing the Pressure Control Assembly

- 27.1 Carefully prise the Control Knob (Fig 21, Item 40) off the front panel.
- 27.2 Disassemble the Rear Case (Refer to Chapter 5, Page 33, Section 4).
- 27.3 Disconnect the Pressure Control Assembly cable (Fig 21, Item 60).
- 27.4 Disconnect the following hoses at the Pressure Control Assembly end:
 - The hose from the 5-way connector (A).
 - The two Rotary Assembly hoses (B and C).
- 27.5 Remove the screws and washers (Fig 21, Items 20 and 30) and the Pressure Control Assembly (Fig 21, Item 10).

28 Installing the Pressure Control Assembly

- 28.1 Install the Pressure Control Assembly (Fig 21, Item 10) onto the spigots of the front panel.
- 28.2 Secure the Pressure Control Assembly in position with screws and washers (Fig 21, Items 20 and 30).
- 28.3 Connect the hose from the 5-way connector to the Pressure Control Assembly (A) and the Rotary Assembly hoses to connections B and C.
- 28.4 Connect the Pressure Control Assembly Cable (Fig 21, Item 60).
- 28.5 Turn the comfort control on the front panel anti-clockwise to its full extent. The gap in the control will point to 'Soft'. Align the arrow on the Control Knob (Fig 21, Item 40) with the gap and locate the guide in the hole. Push the Control knob until it clips into place.
- 28.6 Assemble the rear case (Refer to Chapter 5, Page 33, Section 5).

**Figure 22 - Replacing the High Pressure Switch****Table 19 - High Pressure Switch Parts List**

Item	Part Number	Description	Qty
10	198394	High Pressure Switch	1
20	FAS182	Screw 3 x 20 Pan Head Pozi PT	2
30	151068	High Pressure Switch Wire Assembly	1
40	151091	High Pressure Switch Tube Assembly	1

29 Removing the High Pressure Switch

- 29.1 Disassemble the Rear Case (Refer to Chapter 5, Page 33, Section 4).
- 29.2 Disconnect the hose attached to the High Pressure Switch (A).
- 29.3 Disconnect the High Pressure Switch cable (Figure 21, 30).
- 29.4 Remove the screws (Fig 22, Item 20) and the High Pressure Switch (Fig 22, Item 10).

30 Installing the High Pressure Switch

- 30.1 Install the High Pressure Switch (Fig 22, Item 10) onto the spigots in the pump housing.
- 30.2 Install the screws (Fig 22, Item 20).
- 30.3 Connect the High Pressure Switch cable (Figure 22, Item 30).
- 30.4 Connect the compressor hose to the High Pressure Switch (A) (Figure 22).
- 30.5 Assemble the rear case (Refer to Chapter 5, Page 33, Section 5).

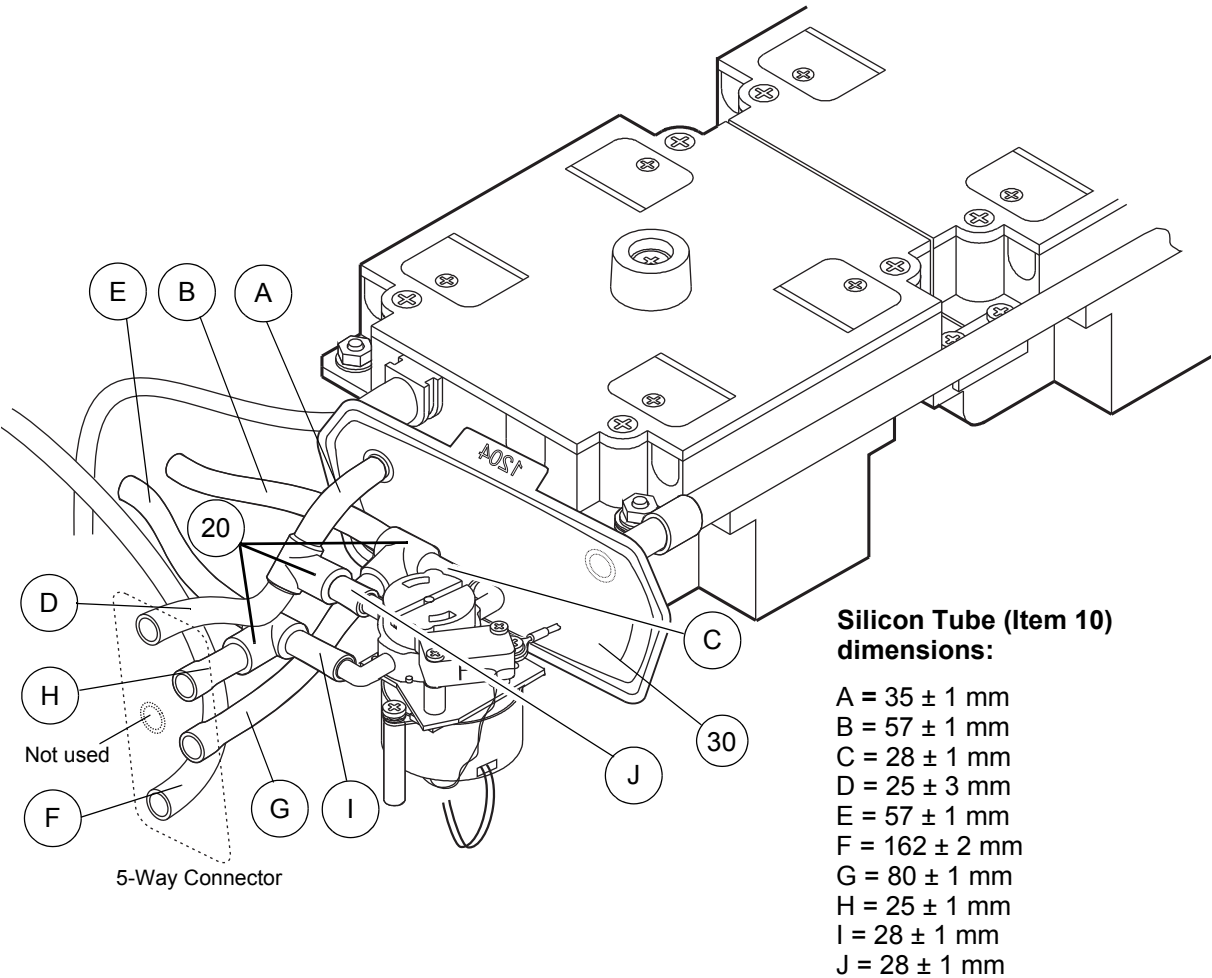


Figure 23 - Replacing the Silencer Bag

Table 20 - Silencer Bag Tube Components

Item	Part Number	Description	Qty
10	SW393	Silicon Tube 1 metre length (To be cut as required as in Fig 23, Item A to J)	1
20	151528	T-Piece	3
30	151098	Silencer bag	1

31 Replacing the Silencer Bag

- 31.1 Disassemble the Rear Case (Refer to Chapter 5, Page 33, Section 4).
- 31.2 Disconnect and remove the Silencer bag (Fig 23, Item 30) from the Rotary Valve Hose (Fig 23, Item 50) and the Compressor Hose.
- 31.3 Install the new Silencer bag (Fig 23, Item 30) from the Rotary Valve Hose and the Compressor Hose. Ensure the Silencer Bag is pushed fully into each hose.
- 31.4 Assemble the rear case (Refer to Chapter 5, Page 33, Section 5).

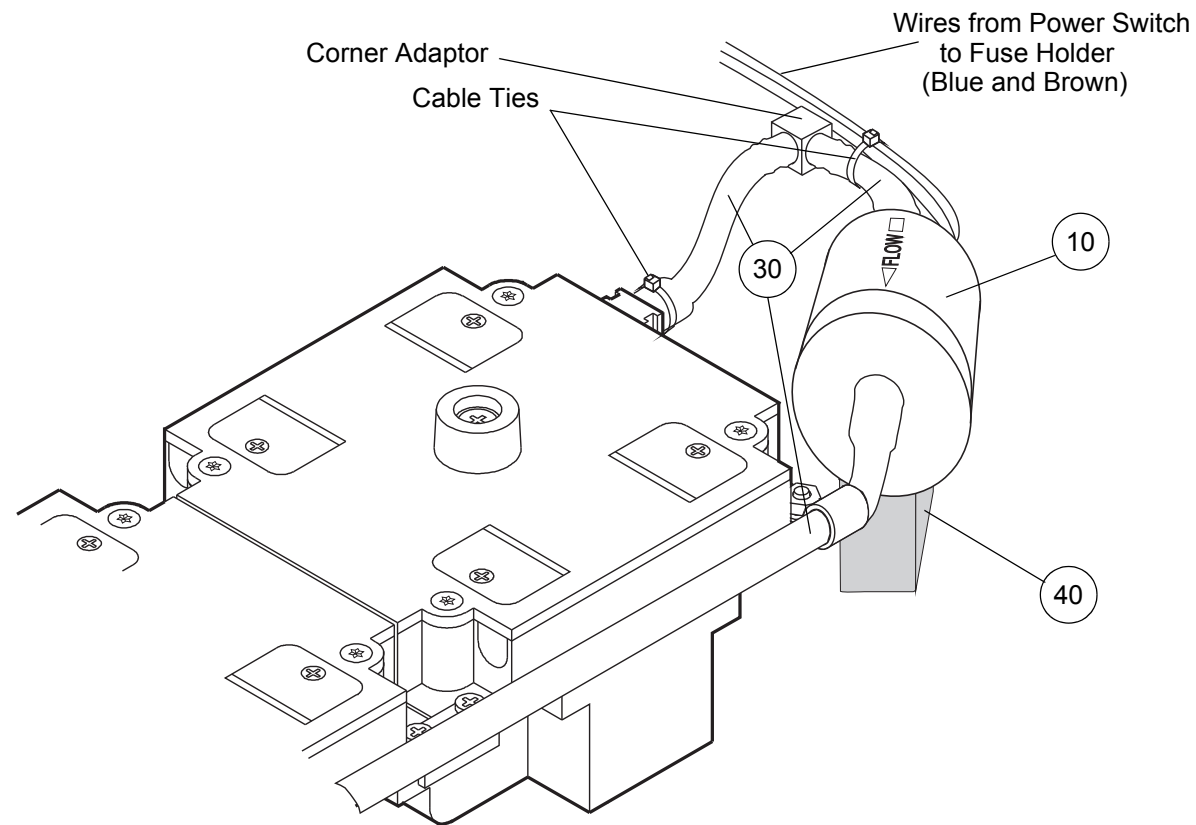


Figure 24 - Replacing the Bio Filter

Table 21 - Bio Filter Part List

Item	Part Number	Description	Qty
10	151450	Bio Filter	1
20	151444	Bio Filter Label	1
30	SW393	Silicon tube, Blue ID 6mm, OD 10mm (Metre length)	A/R
-	BP196	Cable Tie	A/R
40	BP044	Filter Inlet*	2

Note: One Filter Inlet* is fitted to the rear case

32 Removing the Bio Filter

- 32.1 Disassemble the Rear Case (Refer to Chapter 5, Page 33, Section 4).
- 32.2 If it is necessary to replace the Bio Filter hoses as well as the Bio Filter, then cut and remove the cable ties as shown in Figure 24.
- 32.3 Ease the hoses off and remove the Bio Filter (Fig 24, Item 10). If necessary remove the hoses and the corner adaptor.

33 Installing the Bio Filter

- 33.1 If the hoses are being replaced then cut new lengths of hose using the old hoses as a template.
- 33.2 Push the new Bio Filter (Fig 24, Item 10) onto the hose which leads to the Silencer Bag. Ensure the flow indicator on the Bio Filter is uppermost and points towards the Silencer Bag hose.
- 33.3 Install the remaining hoses and corner adaptor to the Bio Filter and the Compressor.
- 33.4 Cable tie the hose connection to the Compressor.
- 33.5 Cable tie the Bio Filter hose to the Power Switch to Fuse Holder Wires.
- 33.6 Assemble the rear case (Refer to Chapter 5, Page 33, Section 5).
- 33.7 Fit a new Bio Filter Label to the rear case of the pump.

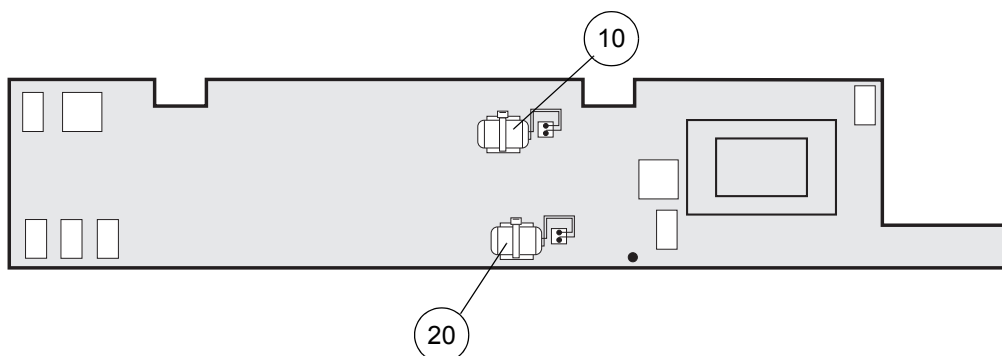


Figure 25 - Changing the Battery

Table 22 - Battery and Sounder Parts List

Item	Part Number	Description	Qty
10	630600	Battery	1
20	063703	Battery	1

34 Changing the Battery

- 34.1 Disassemble the Rear Case (Refer to Chapter 5, Page 33, Section 4).
- 34.2 Disconnect the battery cable from the display board PCB.
- 34.3 Cut and remove the cable tie and remove the battery (Fig 25, Item 10, 20).
- 34.4 Cable tie the new battery into position and connect the battery cable to the display board PCB.
- 34.5 Assemble the rear case (Refer to Chapter 5, Page 33, Section 5).

CHAPTER 6

MATTRESS REPAIR

1 General

This chapter details repair procedures for the standard and narrow Nimbus 4 and Nimbus Professional mattresses.

All repairs should be carried out by ArjoHuntleigh approved service personnel.

After carrying out a service or any repairs, the mattress must be tested for serviceability. Carry out an inflation test on the mattress in accordance with Chapter 4 “Testing”, Page 28, Section 9.

The Mattress parts list can be found on page 87, the parts list for the CPR Unit can be found on page 94 and the Nimbus Professional parts list is on page 88 of this chapter.

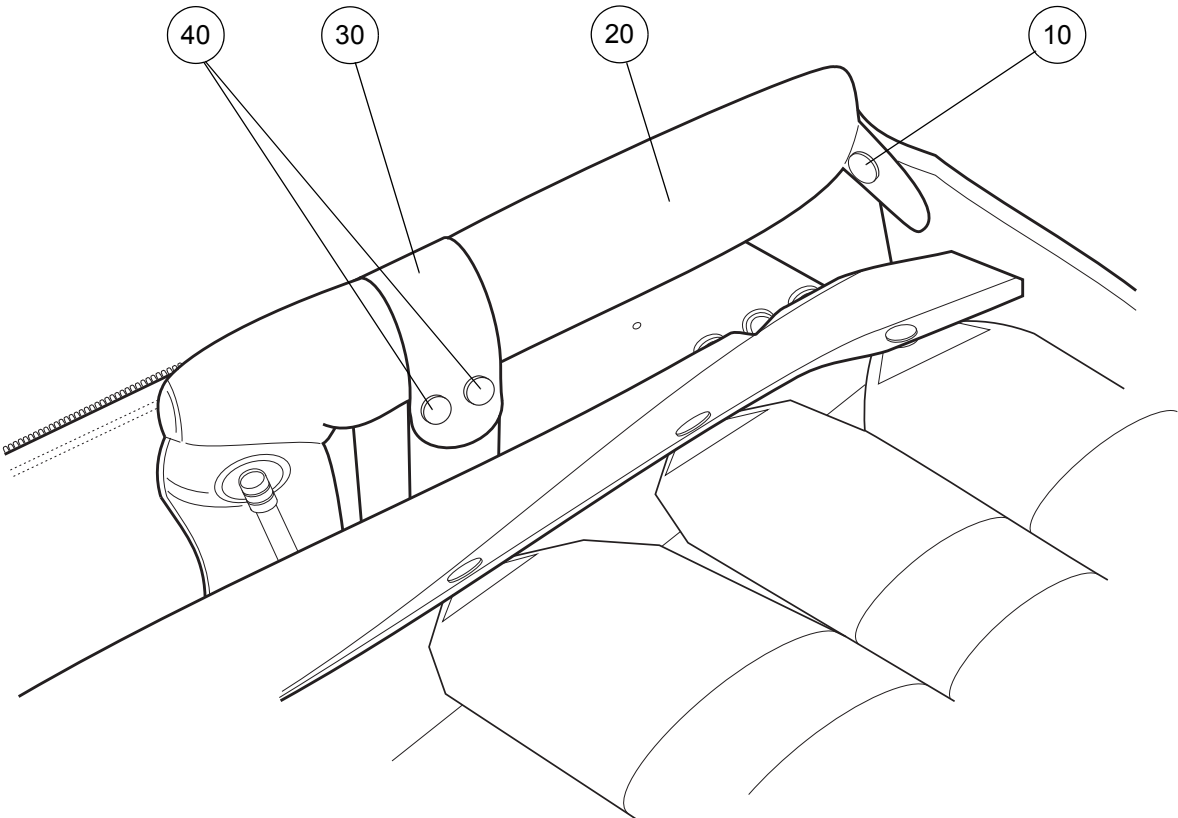


Figure 27 - Disconnecting the Heel Protector

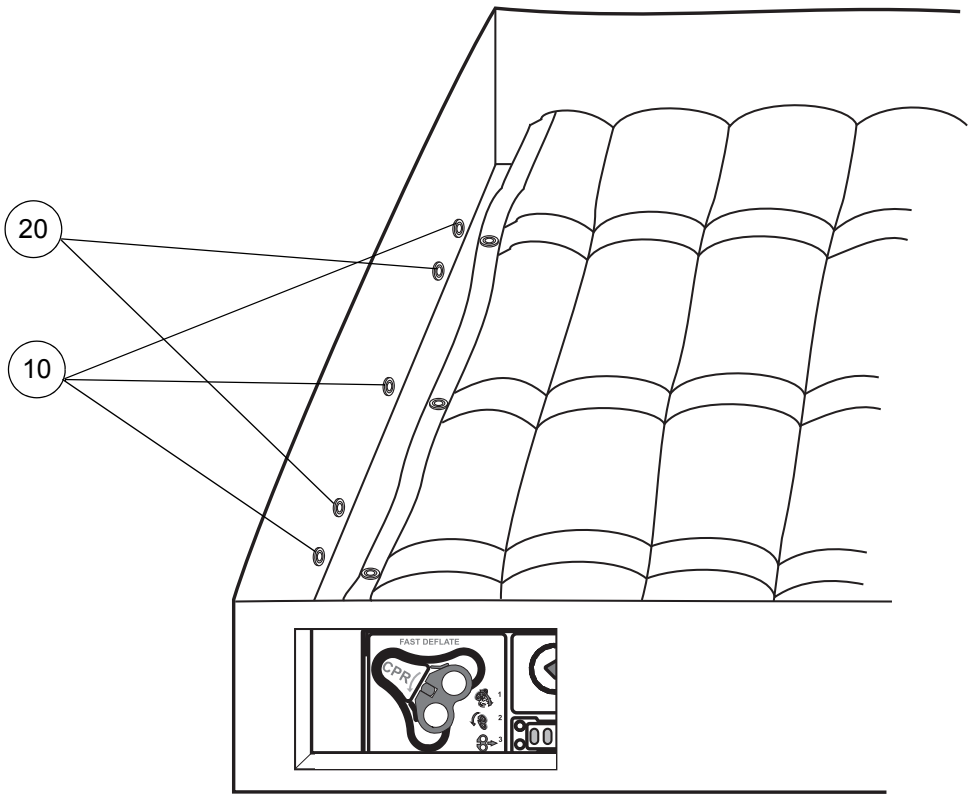


Figure 28 - Disconnecting the pop studs at the foot end of the mattress

2 Removing the Top Cover

- 2.1 Undo the two zips down the long sides of the top cover.

3 Installing the Top Cover

- 3.1 Position the top cover over the mattress with the feet logo uppermost and at the foot end of the bed.
- 3.2 Secure the two zips down the long sides of the mattress.

4 Removing the Base Cover

- 4.1 Remove the top cover (Refer to Chapter 6, Page 69, Section 2).
- 4.2 Unclip the pop stud (Fig 27, Item 10) from the heel protector (Fig 27, Item 20) at the foot end of the bed.
- 4.3 Pull the heel protector (Fig 27, Item 20) out of the loop (Fig 27, Item 03) and unclip the two pop studs (Fig 27, Item 40).
- 4.4 Remove the Vent Valve knobs (Fig 52, Item 10).
- 4.5 Push the transport knob end of the CPR unit out of the base cover and then remove the CPR unit from the two corner pockets.

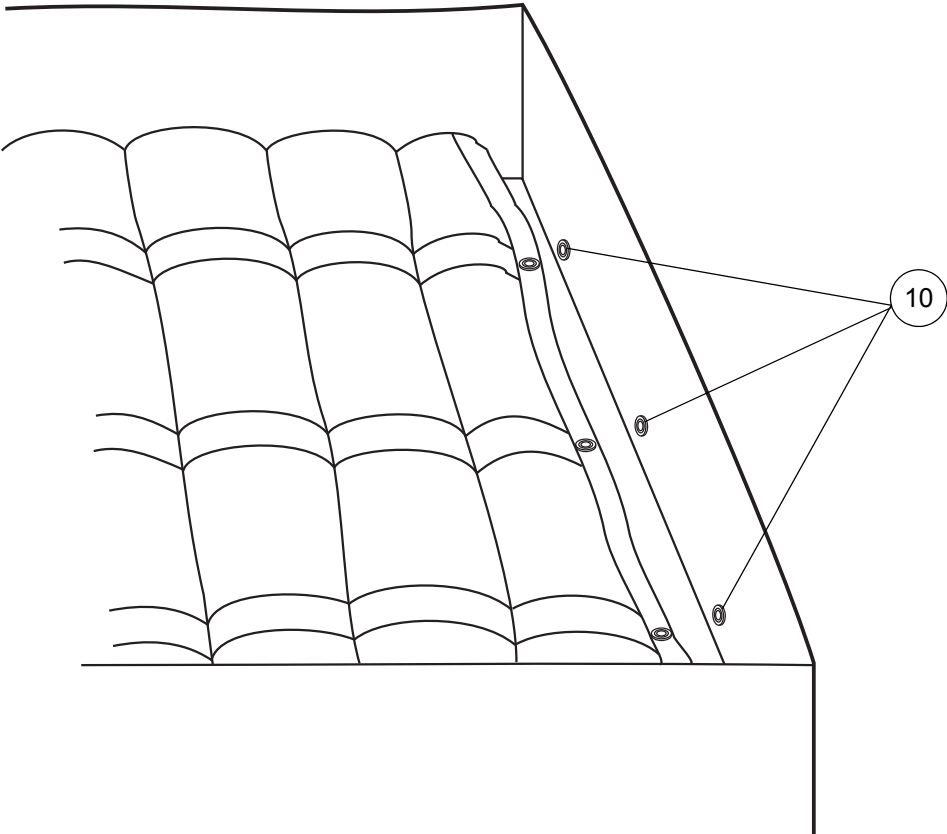


Figure 29 - Disconnecting pop studs at the head end of the mattress

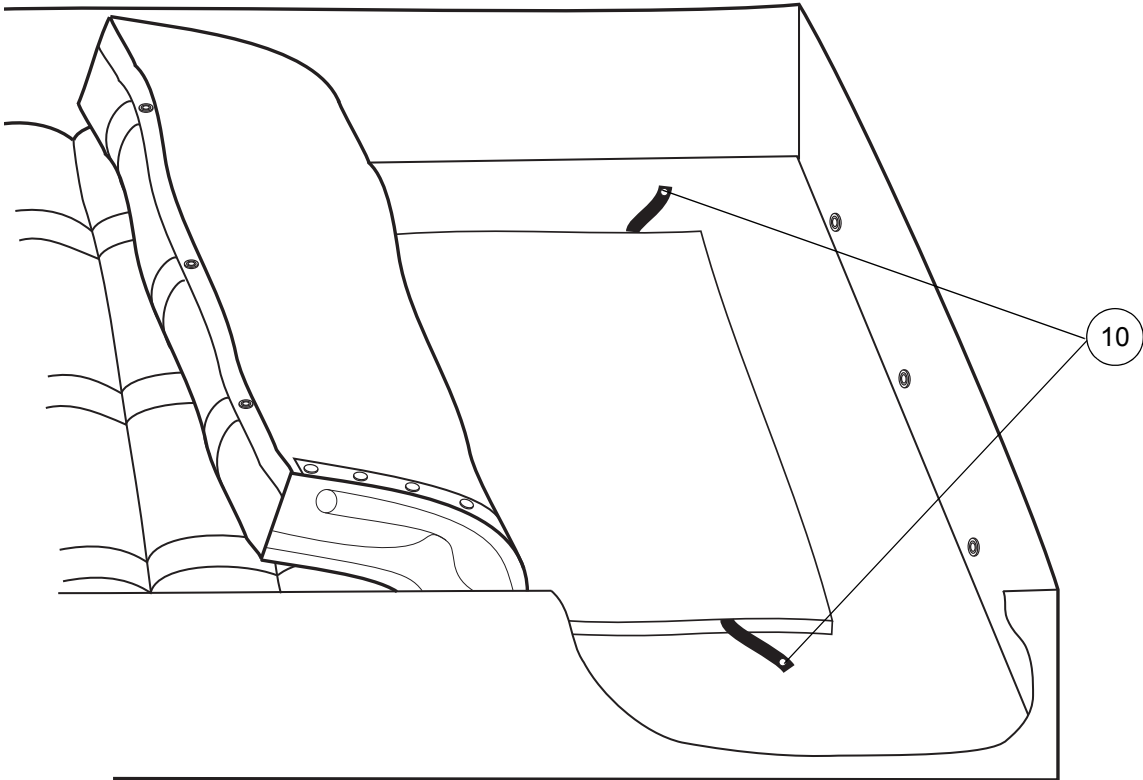


Figure 30 - Disconnecting the sensor assembly at the head end

- 4.6 Disconnect the three pop studs at the foot of the mattress (Fig 28, Item 10) and the three pop studs at the head of the mattress (Fig 29, Item 10) which connect the cell loop sheet to the base of the mattress.
- 4.7 Fold back the mattress cell assembly. Disconnect the two pop studs (Fig 30, Item 10) which connect the Auto Matt assembly at the head end.
- 4.8 Disconnect the two pop studs (Fig 28, Item 20) which connect the Auto Matt assembly at the foot end.
- 4.9 From the foot end, roll the mattress cell assembly with the Auto Matt assembly and remove from the base cover.

5 Installing the Base Cover

- 5.1 Lay out the new base cover (Figure 31).
- 5.2 Position the cell/Auto Matt assembly in the base cover (Fig 31, Item 10) head end making sure the CPR is on the same side as the CPR cut-out on the base cover.
- 5.3 Roll out the cell/Auto Matt assembly, starting from the head end and finishing at the foot end.
- 5.4 Secure the Auto Matt assembly using the two pop studs at the foot end and the two pop studs at the head end (Fig 31, Item 20).
- 5.5 Secure the cell assembly with the three pop studs at the head end and the three pop studs at the foot end (Fig 29, Item 10 and Fig 30, Item 20).
- 5.6 Fit the CPR assembly (Fig 31, Item 10) into the base cover corner pockets (Fig 31, Item 20).
- 5.7 Secure the CPR assembly (Fig 31, Item 10) into the cover using the two security strap pop studs (Fig 31, Item 30).
- 5.8 Push the heel protector through the loop of the CPR securing strap (Fig 31, Item 30) and secure the pop stud (Fig 31, Item 10).
- 5.9 Refit the vent valve knobs (Refer to Chapter 6, Page 95, Section 30)

Note: Make sure that both drag handles are fastened with snaps to the base cover.

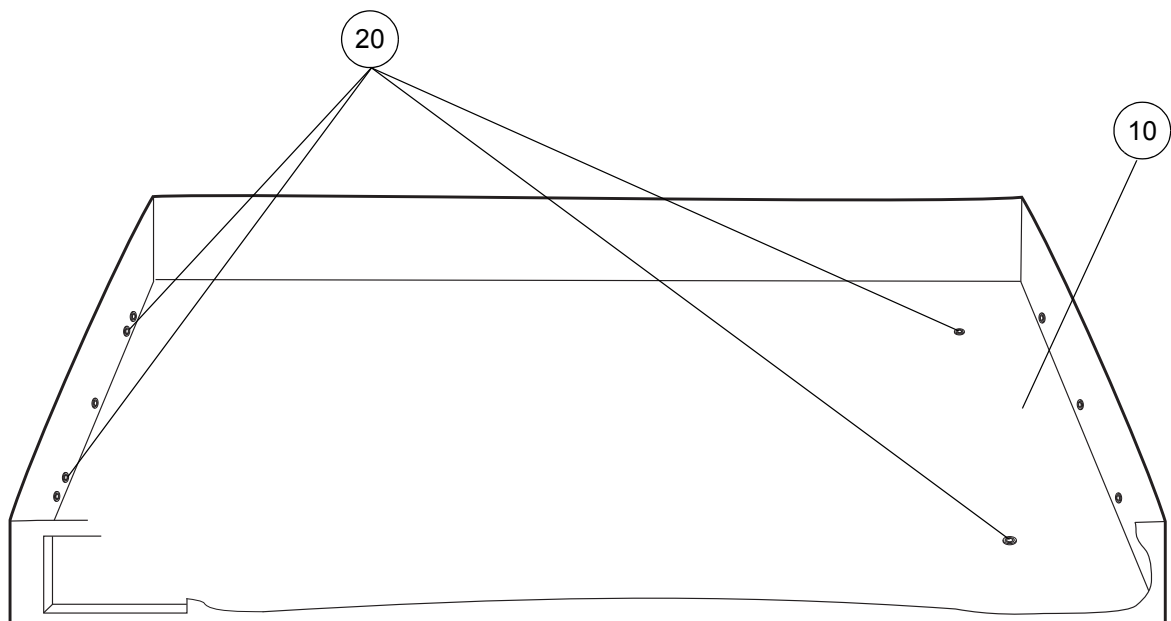


Figure 31 - Base cover positioned for installation of cell/Auto Matt assemblies

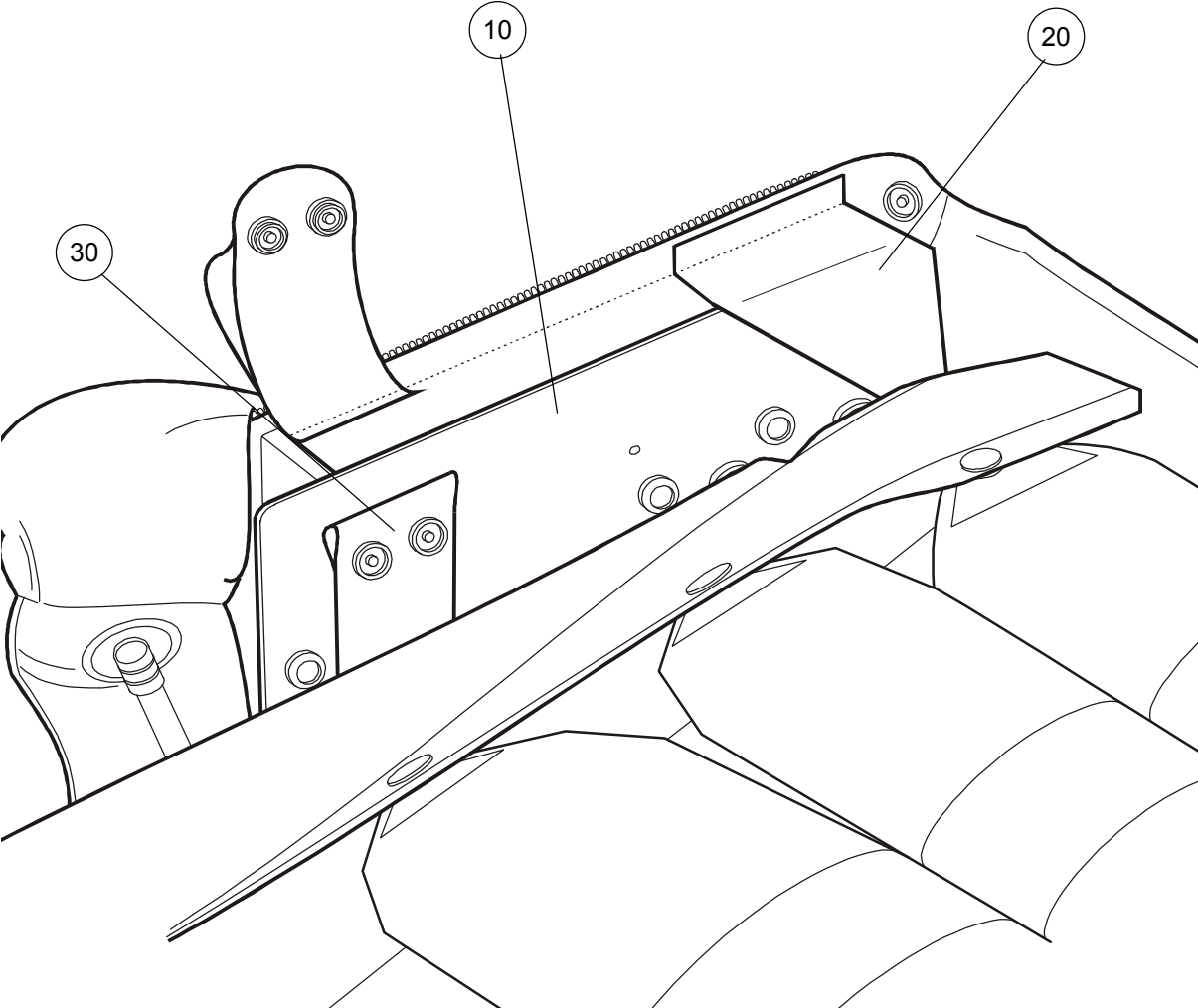
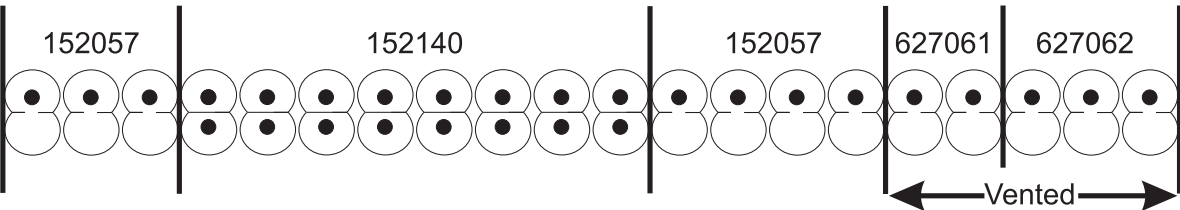


Figure 32 - Fitting the CPR Unit in the Base Cover Pocket.

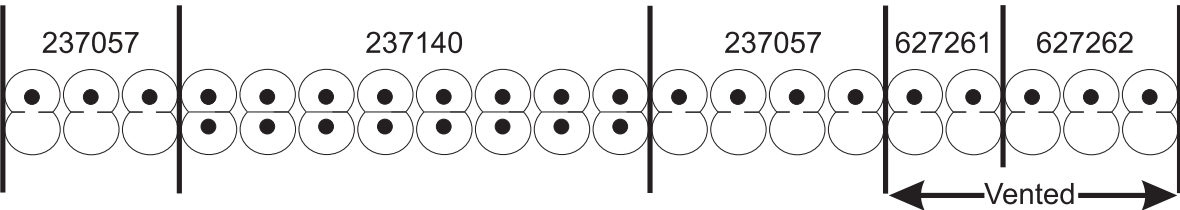
Head end

Foot end

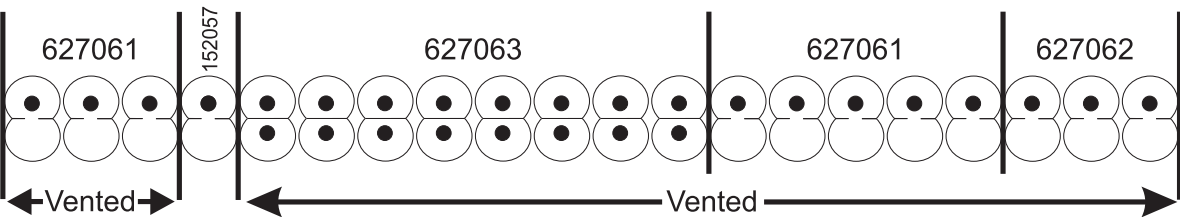
Nimbus 4 Standard 650001



Nimbus 4 Narrow 650201



Professional Standard 651001



Professional Narrow 651201

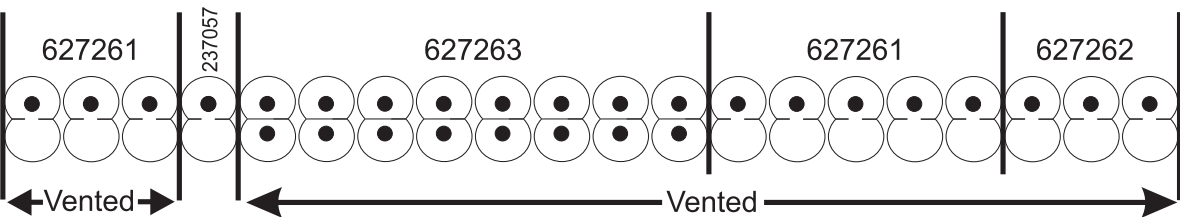


Figure 33 - Cell Configuration and Part Numbers

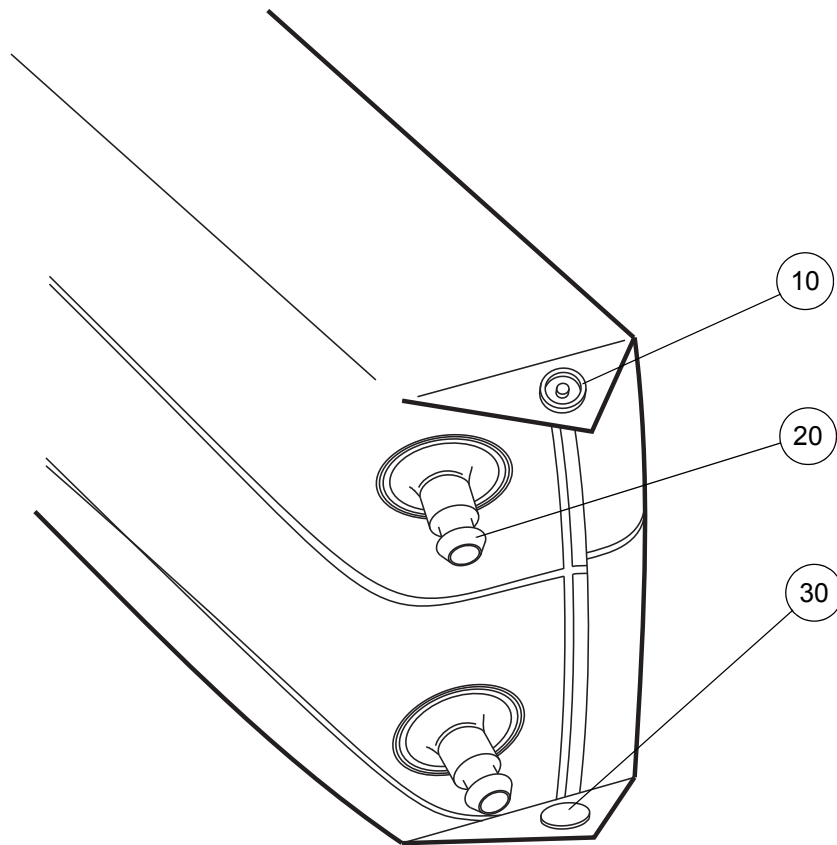


Figure 34 - Cell pop studs and connectors

6 Cell Replacement

- 6.1 There are four different types of cell (20 in total) in a Nimbus 4 and Nimbus Professional mattress. The cell configuration is shown in Figure 33 which shows both Nimbus 4 and Nimbus Professional Standard and Narrow mattresses.
- 6.2 Always check that the replacement cell is of the same type as the cell to be changed.

7 Removing a Cell

- 7.1 Remove the top cover (Refer to Chapter 6, Page 69, Section 2).
- 7.2 Disconnect the four pop studs (two either end) located on the cell corner flaps (Fig 34, Items 10 and 30).
- 7.3 Remove the Vent Valve knobs if required (Refer to Chapter 6, Page 95, Section 30).
- 7.4 Disconnect the connector(s) (Fig 34, Item 20) from the manifold assembly.

Note: *The AST cells have two connectors. All other types of cells have one connector.*

- 7.5 Remove the cell from the loops in the base of the mattress.

8 Installing a Cell

- 8.1 Make sure the cell is the correct type for its position in the mattress (Refer to Figure 33).
- 8.2 Feed the cell through the loops in the base of the mattress, the connectors should be adjacent to the manifold assembly.
- 8.3 Locate the mattress loop sheet (Fig 35, Item 20) over the manifold pop stud (Fig 35, Item 30) and connect the lower cell pop stud (Fig 35, Item 10) to the manifold assembly. If the pop studs will not connect, then turn the cell through 180 degrees, the connector(s) must remain adjacent to the manifold.

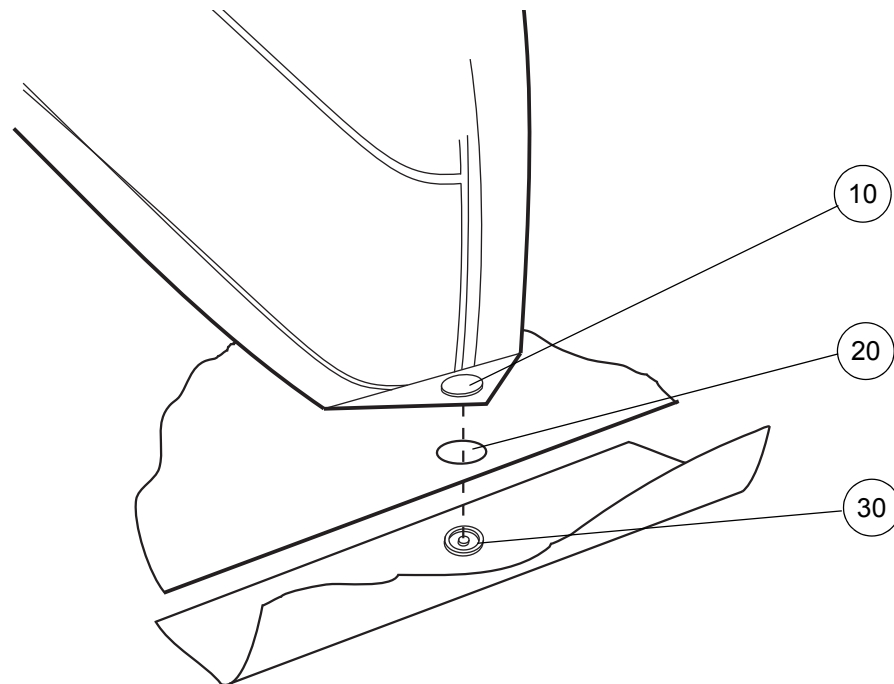


Figure 35 - Lower Manifold Pop Stud

- 8.4 Connect the lower pop stud, at the opposite end of the cell, to the mattress loop sheet.
- 8.5 Push the cell connector(s) (Fig 34, Item 20) fully into the manifold assembly.
- Note:** *Fitting the connectors into the manifold assembly is made easier if the connector is wetted with methylated spirit immediately prior to insertion.*
- 8.6 Connect the two pop studs (Fig 34, Item 10) at the top of the cell to the mattress.
- 8.7 Refit the Vent Valve knobs if required (Refer to Chapter 6, Page 95, Section 30).
- 8.8 Check that all pop studs on the mattress remain connected and have not been disturbed by the repair.
- 8.9 Install the top cover (Refer to Chapter 6, Page 69, Section 30).

9 Removing the Manifold Assembly

- 9.1 Remove the top cover (Refer to Chapter 6, Page 69, Section 2).
- 9.2 Disconnect all Vent Valve knobs (Refer to Chapter 6, Page 95, Section 30).
- 9.3 Disconnect all the upper pop studs (Fig 34, Item 10) on the cell corner flaps from the manifold assembly.
- 9.4 Disconnect all the cell connector(s) (Fig 34, Item 20) from the manifold assembly.
- 9.5 Disconnect all the lower pop studs (Fig 34, Item 30) on the cell corner flaps from the manifold assembly.
- 9.6 Disconnect the three pop studs (Fig 28, Item 10) which connect the cell loop sheet to the base cover at the foot end of the bed.
- 9.7 Remove the Link Manifolds from the Main Manifold (Fig 36, Items A, B and C).
- 9.8 Remove the manifold assembly.

10 Installing the Manifold Assembly

- 10.1 Connect the Link Manifolds.
- 10.2 Connect the Lower pop studs (Fig 28, Item 10).
- 10.3 Connect the Cell connectors (Fig 34, Item 20).
- 10.4 Connect the Upper pop studs (Fig 34, Item 10).
- 10.5 Connect the foot end loop sheet to the base cover (Refer to Chapter 6, Page 71, Section 5).
- 10.6 Refit the Vent Valve knobs (Refer to Chapter 6, Page 95, Section 30).
- 10.7 Refit the Top Cover (Refer to Chapter 6, Page 69, Section 3).

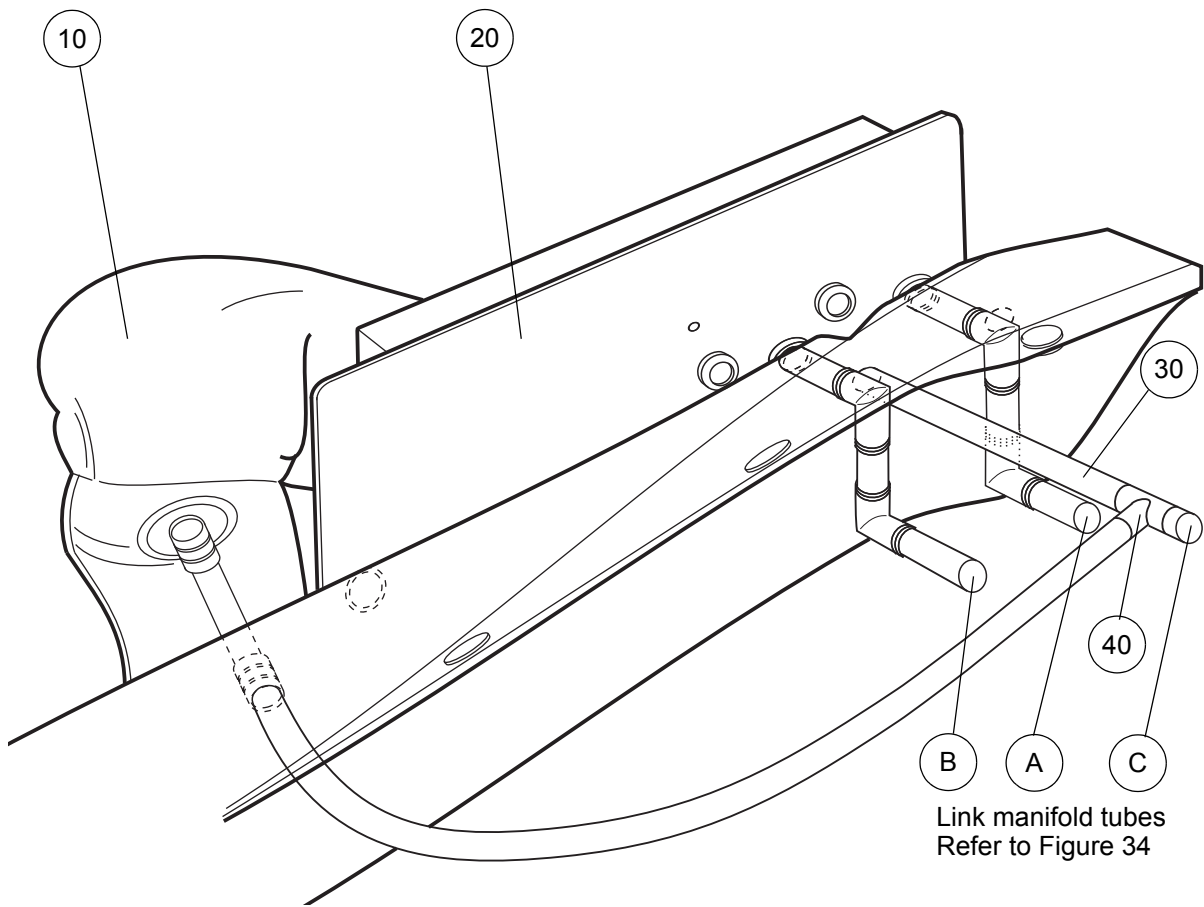


Figure 36 - CPR and Heel Protector Connections to the Link Manifold assemblies

Table 24 - CPR and Heel Protector Connection components list

Item	Part Number	Description	Qty
10	412073	Heel protector	1
20	627051	CPR Assembly	1
30	412100	Link Manifold Tee	1
40	REF	Tee Connection	1
A & B	REF	Link Manifold	2

11 Removing the Heel Protector

- 11.1 Remove the top cover (Refer to Chapter 6, Page 69, Section 2).
- 11.2 Unclip the pop stud (Fig 27, Item 10) from the heel protector (Fig 27, Item 20) at the foot end of the bed.
- 11.3 Pull the heel protector (Fig 27, Item 20) out of the loop (Fig 27, Item 30).
- 11.4 Disconnect the heel protector tubing (Fig 36, Item 60) at the link manifold tee.

12 Installing the Heel Protector

- 12.1 Connect the Heel Protector tubing (Fig 36, Item 60) at the link Tee manifold. Ensure that the tubes marked A, B and C connect to the respective connections (Figure 38)
- 12.2 Pull the Heel Protector (Fig 27, Item 20) through the loop (Fig 27, Item 30).
- 12.3 Clip the pop stud (Fig 27, Item 10) of the Heel Protector (Fig 27, Item 20) at the foot end of the bed.
- 12.4 Refit the Top Cover (Refer to Chapter 6, Page 69, Section 3).

13 Removing the CPR Assembly

- 13.1 Remove the Top Cover (Refer to Chapter 6, Page 69, Section 2).
- 13.2 Remove the Heel Protector (Refer to Chapter 6, Page 77, Section 11).
- 13.3 Unclip the CPR securing strap (Fig 31, Item 30).
- 13.4 Remove the two Auto Matt connections.
- 13.5 Remove the three clips from the three link manifold tubing at the CPR and remove the Link Manifolds.
- 13.6 Remove the CPR assembly from the loop sheet side panel by disconnecting the three grommets.

14 Installing the CPR Assembly

- 14.1 Connect the CPR assembly to the side panel of the loop sheet.
- 14.2 Refit the three link manifold tubing at the CPR assembly and refit the Link Manifolds.
- 14.3 Refit the Auto Matt connections.
- 14.4 Refit the CPR securing strap (Fig 32, Item 30).
- 14.5 Refit the Heel Protector (Refer to Chapter 6, Page 78, Section 12).
- 14.6 Refit the Top Cover (Refer to Chapter 6, Page 69, Section 30).

15 Removing the Partial Non-Return Valve Assemblies

- 15.1 Unzip the top cover on the CPR side of the mattress and fold it back.
- 15.2 Locate the partial non-return valve assemblies (Fig 37, Item 10) on the inside at the foot end of the manifold assembly.
- 15.3 Disconnect the partial non-return valve assemblies from the manifold assembly at both ends.

16 Installing the Partial Non-Return Valve Assemblies

- 16.1 Connect the partial non-return valve assemblies (Fig 37, Item 10) to the manifold assembly. Make sure that the arrow mark on both valves points to the head end of the mattress.

Note: *Mattress malfunction will occur if the partial non-return valve assemblies are fitted incorrectly.*

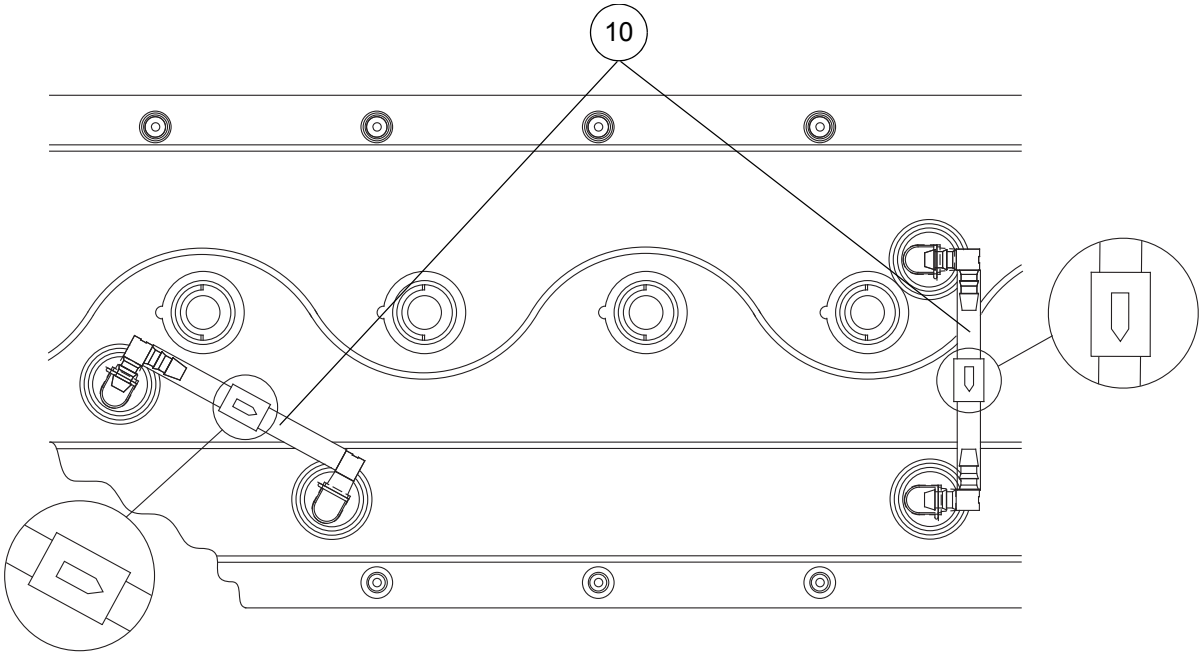


Figure 37 - Partial Non-Return Valve Assemblies

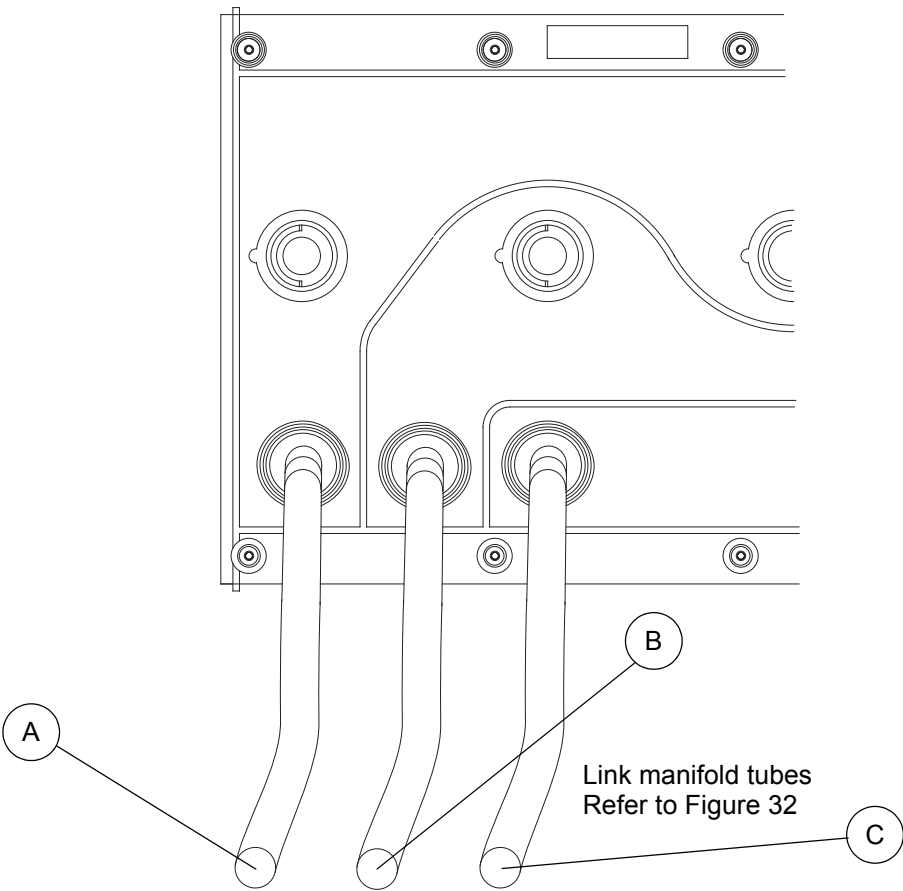


Figure 38 - Manifold connections

17 Removing the Loop Sheet Assembly

- 17.1 Remove the top cover (Refer to Chapter 6, Page 69, Section 2).
- 17.2 Disconnect all the lower pop studs (Fig 34, Item 30) on the cell corner flaps from the manifold assembly.
- 17.3 Remove the Heel Protector (Refer to Chapter 6, Page 77, Section 11).
- 17.4 Remove the CPR Assembly (Refer to Chapter 6, Page 78, Section 13).
- 17.5 Disconnect all the lower and upper pop studs (Fig 34, Items 10 and 20) on the cell corner flaps from the side of the loop sheet.
- 17.6 Remove each cell from the loops and remove the loop sheet assembly.
- 17.7 Refer to Page 81, Section 19 and remove the elastic loops and support boards from the loop sheet.

18 Installing the Loop Sheet Assembly

- 18.1 Fold the cells back over the manifold assembly.
- 18.2 Lay the loop sheet assembly over the Auto Matt assembly
- 18.3 Install the elastic loops and support boards (Refer to Chapter 6, Page 81, Section 19).
- 18.4 Feed the cells through their corresponding loops and connect the lower and upper pop studs (Fig 34, Items 10 and 20) on the cell corner flaps to the side of the loop sheet.
- 18.5 For each cell, locate the mattress loop sheet (Fig 35, Item 20) over the manifold pop stud (Fig 35, Item 30) and connect the lower cell pop stud (Fig 35, Item 10) to the manifold assembly.
- 18.6 Install the CPR assembly (Refer to Chapter 6, Page 78, Section 14).
- 18.7 Check that all pop studs on the mattress remain connected and have not been disturbed.
- 18.8 Install the top cover (Refer to Chapter 6, Page 69, Section 3).

19 Replacing the Elastic Loops

Note: The five cells at the foot end of the bed are retained by elastic loops which are held in position by plastic supports located into pockets on the topside of the loop sheet.

- 19.1 Remove the top cover (Refer to Chapter 6, Page 69, Section 2).
- 19.2 Unclip the cell pop studs of the cell which requires the new elasticated loop on the CPR side of the mattress, then pull the cell out of the loop.
- 19.3 Pull the loop sheet pocket (Fig 39, Item 30) towards the manifold to expose the plastic support (Fig 39, Item 40) out of the pocket and pull out the support from all three loops over the top of the manifold while holding the cover and manifold down.
- 19.4 Insert the end of the plastic support (Fig 39, Item 10) into the pocket on the topside of the loop sheet and feed it through to the first gap inside the loop sheet.
- 19.5 Feed the plastic support (Fig 39, Item 40) through the small loop of an elastic loop (Fig 39, Item 20) and then back into the loop sheet. Attach the remaining two elastic loops in a similar manner until the support is fully located in the pocket (Fig 39, Item 30).
- 19.6 Pass the cell, from the manifold end, through the elastic loops and connect the lower and upper pop studs to the loop sheet.
- 19.7 Pull the base cover up the side of the manifold and install the top cover (Refer to Chapter 6, Page 69, Section 3).

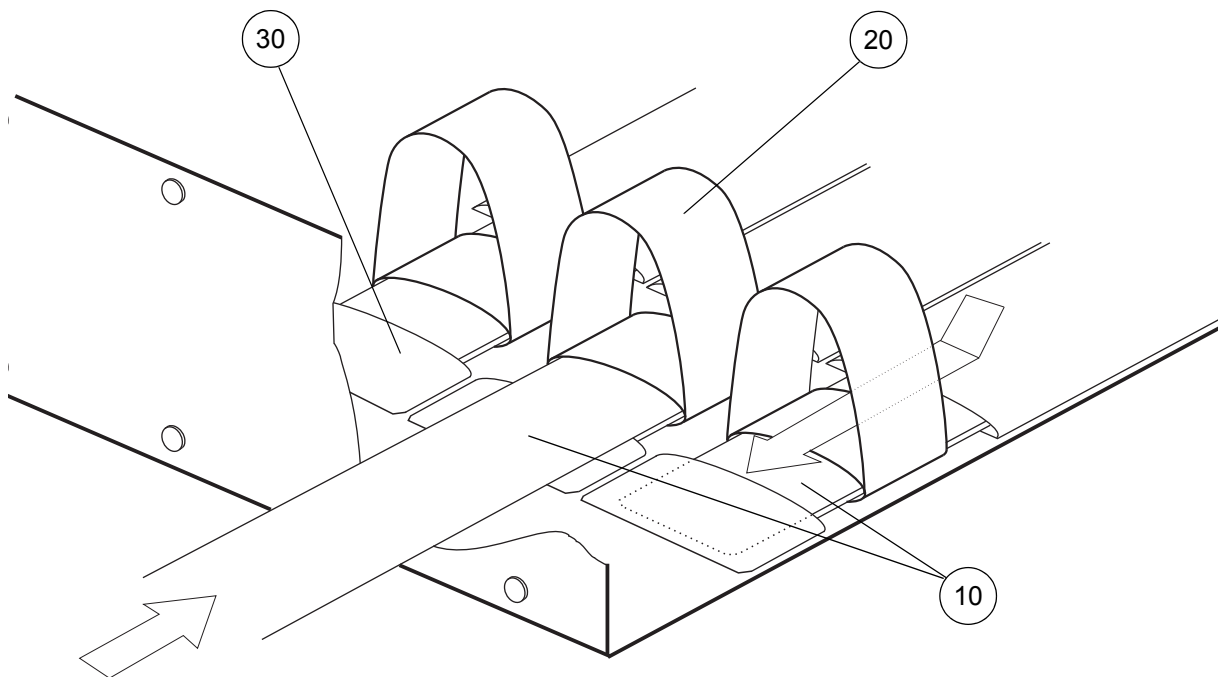


Figure 39 - Replacing the Elastic Loops

Table 25 - Elastic Loops component list

Item	Part Number	Description	Qty
10	PXD333	Support Board	5
20	152404	Elastic Loop	15
30	REF	Support Board Pocket	

20 Removing the Auto Matt Assembly

- 20.1 Remove the top cover (Refer to Chapter 6, Page 69, Section 2).
- 20.2 Disconnect the three pop studs (Fig 29, Item 10) which connect the cell loop sheet to the base cover at the head end of the bed.
- 20.3 Roll the mattress cell assembly back as far as possible towards the foot end of the bed.
Note: On Nimbus Professional mattresses, the Vent Valve knobs must first be removed.
- 20.4 Disconnect the pop studs (Fig 40, Item 10) securing the Auto Matt (Fig 40, Item 20).
- 20.5 Disconnect the Auto Matt hoses (Fig 40, Item 30) from the hose sleeves (Fig 40, Item 40) at the CPR.
- 20.6 Remove the Auto Matt (Fig 40, Item 20).

21 Installing the Auto Matt

- 21.1 Position the Auto Matt (Fig 40, Item 20) sheet and connect the pop studs (Fig 40, Item 10) securing the Auto Matt (Fig 40, Item 20) to the base cover.
- 21.2 Connect the Auto Matt hoses (Fig 40, Item 30) to the hose sleeves on the rear of the CPR unit (Fig 49, Item 100).
- 21.3 Unroll the mattress cell assembly and connect the six pop studs (Fig 29, Item 10) which attach the cell loop sheet to the base cover at the head end of the bed.
- 21.4 Refit the Vent Valve knobs.
- 21.5 Install the top cover (Refer to Chapter 6, Page 69, Section 3).

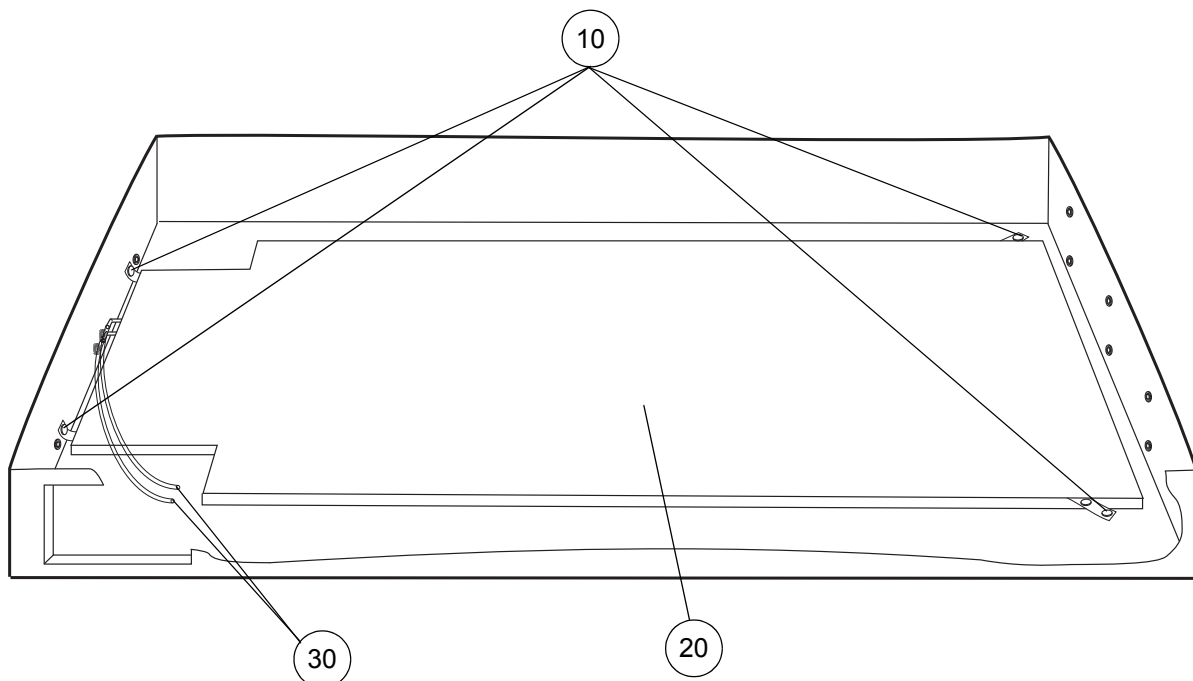


Figure 40 - Auto Matt connections

22 Tubeset Assembly Components

There are two identical tubeset connectors on the tubeset assembly, connected together by a 5-way tubeset extrusion (Refer to Figure 41).

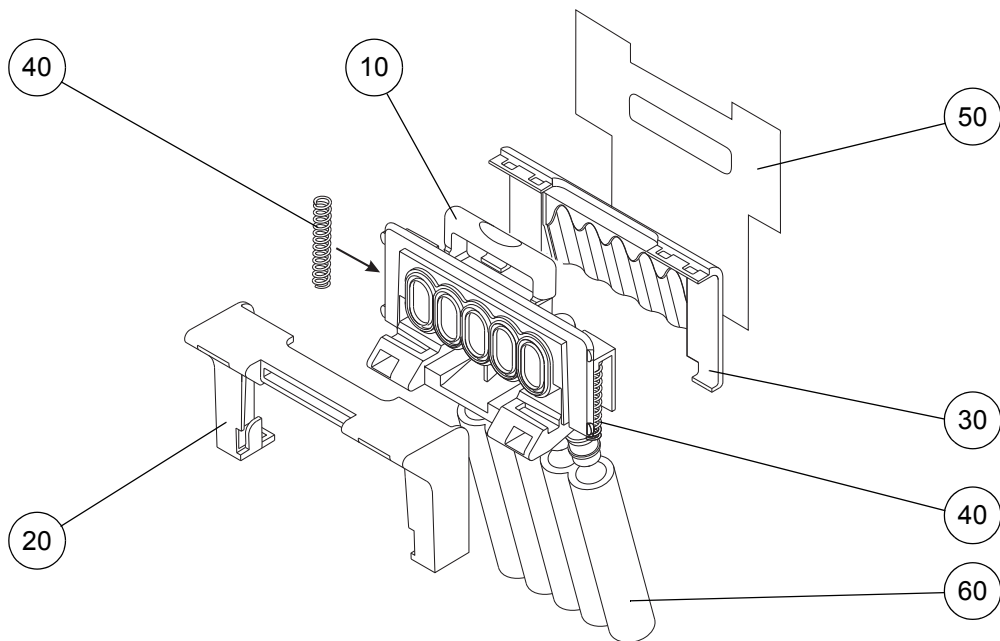


Figure 41 - Standard and Extended Tubeset Assembly

Table 26 - Tubeset Assembly

Item	Part Number	Description	Qty
-	151200	Tubeset Assembly, 5-Way, Mk II, Standard (1m long)	1
-	151201	Tubeset Assembly, 5-Way, Mk II, Extended (2.5m long)	1
10	151526	Connector Body, 5-Way	2
20	151525	Front Cover, 5-Way Connector	2
30	151527	Rear Cover, 5-Way Connector	2
40	151342	Spring, 5-Way Connector	4
50	151538	Label, 5-Way Connector	2
60	151300	Tubeset Extrusion, 1m long (for Standard Assembly, 151200)	1
	151429	Tubeset Extrusion, 2.5m long (for Extended Assembly, 151201)	1

Figure 42 - Replacing the Tubeset Extrusion

23 Repairing the Tubeset Connector Assembly

- 23.1 Remove and discard the adhesive label (Fig 41, Item 50) from the rear of the connector assembly (Refer to Figure 43).

Note: A new label must always be fitted after any repair, since the old label is easily damaged and will not stick properly to the connector assembly after it has been re-assembled.

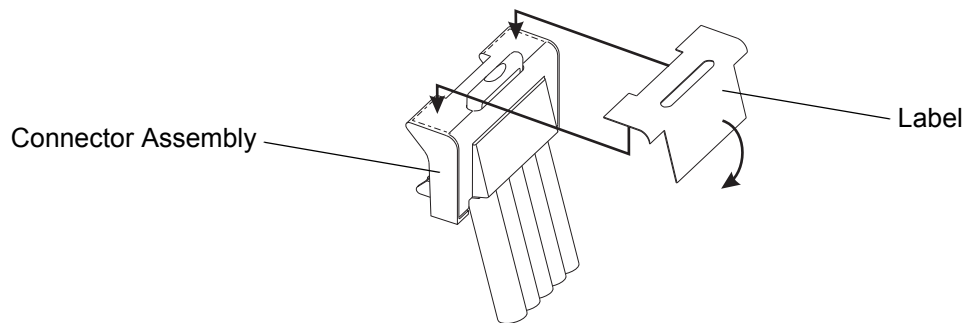


Figure 43 - Replacing the Label

- 23.2 Remove the rear cover (Fig 41, Item 30) from the front cover (Fig 41, Item 20), as follows (Refer to Figure 44):

- 23.2.1 At one corner at the bottom of the connector assembly, carefully insert a small flat-bladed screwdriver between the front cover and rear cover.
- 23.2.2 Pull this bottom corner of the rear cover outwards, to release it from the front cover.
- 23.2.3 Repeat Paras 23.2.1 and 23.2.2 to release the other bottom corner of the rear cover.
- 23.2.4 Pull the rear cover downwards to release the top of the rear cover from the front cover.

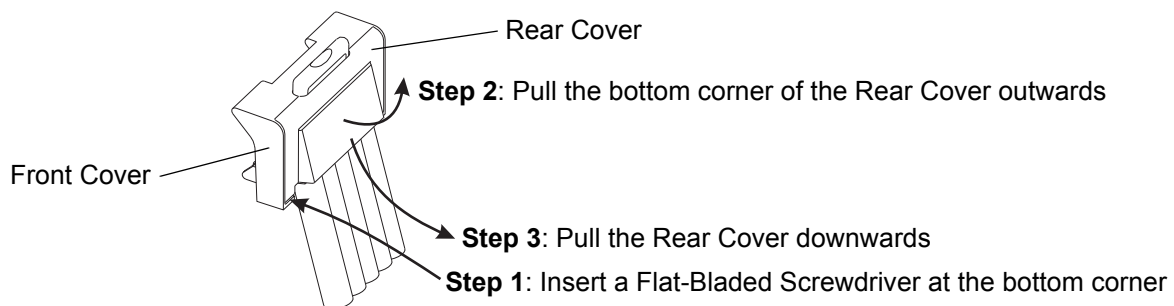


Figure 44 - Removing the Rear Cover

- 23.3 Remove the front cover (Fig 41, Item 20) from the connector body (Fig 41, Item 10), as follows (Refer to Figure 45):

- 23.3.1 Push the connector body downwards and the front cover upwards to compress the two springs (Fig 41, Item 40).
- 23.3.2 When fully compressed, carefully insert a small flat-bladed screwdriver between the top of the connector body and the slot in the top centre of the front cover, and push the top of the connector body out of the slot in the front cover.
- 23.3.3 Lift the bottom of the connector body, together with the two springs, out of the bottom of the front cover.
- 23.3.4 Remove the two springs from the connector body.

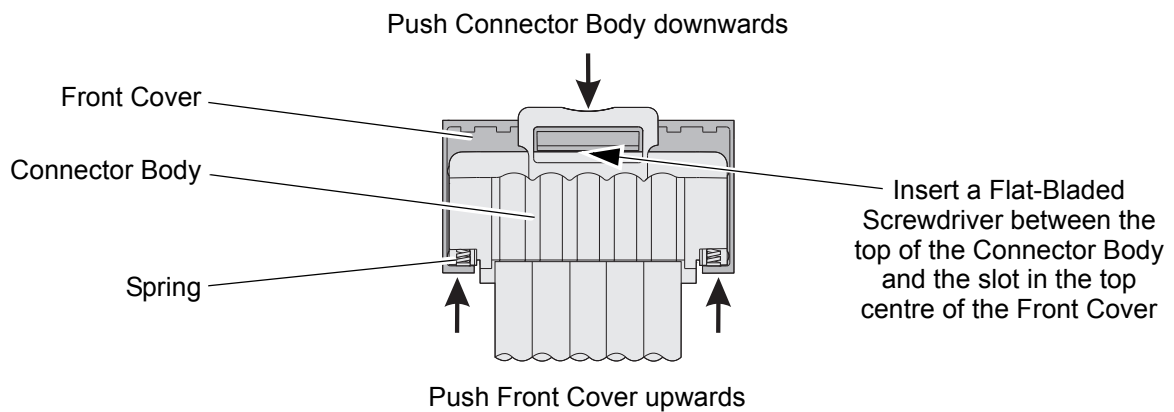


Figure 45 - Removing the Front Cover

23.4 Remove the tubeset extrusion (Fig 41, Item 60) from the connector body (Fig 41, Item 10), as follows (Refer to Figure 46):

23.4.1 Hold the one of the connector body in one hand and the tubeset extrusion in the other.

23.4.2 Pull the connector body off the tubeset extrusion.

Note: *The connector body is tightly secured to the tubeset extrusion. You may have to pull very hard to separate them.*

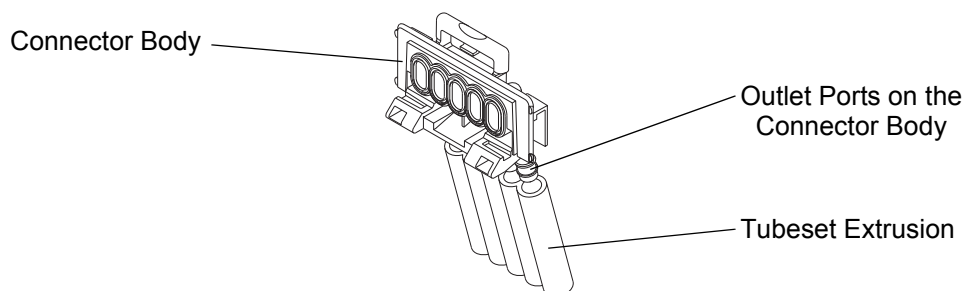


Figure 46 - Removing the Connector Body from the Tubeset Extrusion

23.5 Install the tubeset extrusion (Fig 41, Item 60) onto the connector body (Fig 41, Item 10), as follows (Refer to Figure 46):

23.5.1 If the old tubeset extrusion is being re-installed, check the condition of the end of the tubeset extrusion. If the end of any of the five tubes are split or damaged, do either of the following:

- Using a sharp knife, cut approximately 25mm off the end of the old tubeset extrusion.

Note: *Make sure the end of the tubeset is cut straight, and not at an angle.*

- Discard the old tubeset extrusion and install a new one.

23.5.2 If the old connector body is being re-installed, check the condition of the outlet ports on the connector body. If any of the five outlet ports are damaged, discard the old connector body and install a new one.

23.5.3 Position the connector body at the end of the tubeset extrusion.

Note: If one connector body has already been fitted to the tubeset extrusion, make sure that both connector bodies are orientated as shown in Figure 42.

- 23.5.4 Push the end of the tubeset extrusion fully onto the outlet ports on the connector body, so that the end of the tube extrusion is flush with connector body.

Note: The tubeset extrusion is a very tight fit on the connector assembly.

- 23.5.5 After it has been assembled, check the security of the tubeset extrusion on the connector assembly. If it is **NOT** a tight fit, do the following:
- 23.5.5.1 Remove the tubeset extrusion from the connector body (Refer to Para 23.4).
 - 23.5.5.2 Check the tubeset extrusion and the outlet ports on the connector body, and repair or replace as necessary (Refer to Paras 23.5.1 and 23.5.2).
 - 23.5.5.3 Re-assemble the tubeset extrusion onto the connector assembly (Refer to Paras 23.5.3 and 23.5.4).

- 23.6 Install the front cover (Fig 41, Item 20) onto the connector body (Fig 41, Item 10), as follows:

- 23.6.1 Insert the two springs (Fig 41, Item 40) into the slots in the sides of the connector body (Refer to Figure 41).

Note: The sides of the slot will hold the top of the spring in position.

- 23.6.2 Position the connector body on top of the front cover (Refer to Figure 47).
- 23.6.3 Put the ends of the two springs on the bottom of the connector body into the slots in the bottom of the front cover (Refer to Figure 47).
- 23.6.4 Push the connector body downwards and the front cover upwards to compress the two springs (Refer to Figure 45).
- 23.6.5 When *fully* compressed, use a small flat-bladed screwdriver to push the top of the connector body under the slot in the top centre of the front cover, until it “clicks” into position (Refer to Figure 45).

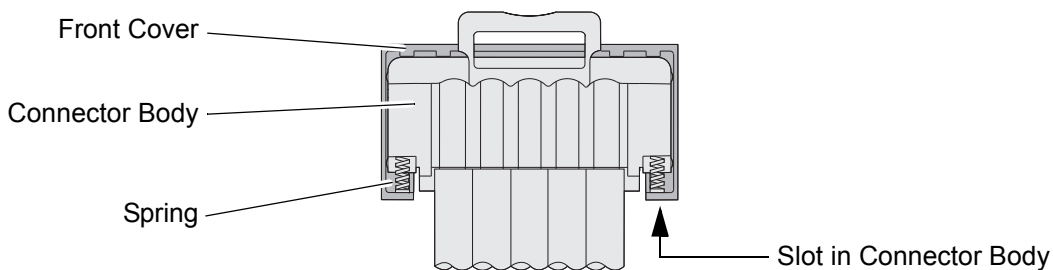


Figure 47 - Installing the Front Cover

- 23.7 Install the rear cover (Fig 41, Item 30) onto the front cover (Fig 41, Item 20), as follows (Refer to Figure 48):

- 23.7.1 At the top of the connector assembly, locate the four holes in the top of the rear cover over the four lugs in the top of the front cover.
- 23.7.2 At the bottom of the connector assembly, push the two bottom corners of the rear cover into the slots in the front cover, until they “click” into position.

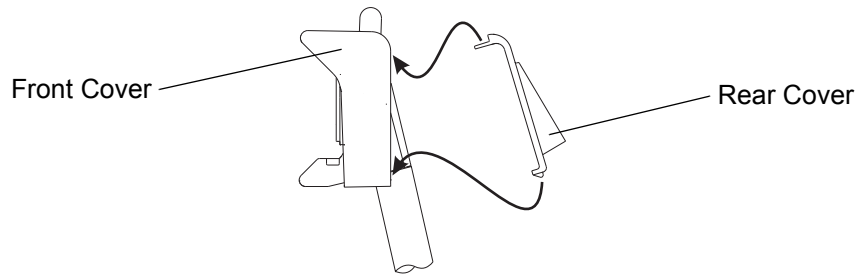


Figure 48 - Installing the Rear Cover

- 23.8 Install a new adhesive label (Fig 41, Item 50) onto the rear of the connector assembly (Refer to Figure 43 for the exact position).

Note: A new label must always be fitted after any repair, since the old label is easily damaged and will not stick properly to the connector assembly after it has been re-assembled.

24 Service Engineers Tubeset Assembly

This is a special tubeset assembly for service engineers. It comprises a short 100mm length of tubeset extrusion, with a new-style 5-way tubeset connector at one end and four straight connectors at the other end. The centre tube in the extrusion has no straight connector fitted.

Refer to Table 27 for the tubeset assembly parts list.

Table 27 - Service Engineers Tubeset Assembly

Item	Part Number	Description	Qty
-	151126	Tubeset Assembly, 5-Way, Mk II, Service Engineers	1
10	151526	Connector Body, 5-Way	1
20	151525	Front Cover, 5-Way Connector	1
30	151527	Rear Cover, 5-Way Connector	1
40	151342	Spring, 5-Way Connector	2
50	151538	Label, 5-Way Connector	1
60	151540	Tubeset Extrusion, 100mm long	1
70	197301	Connector, Straight Male/Male	4

25 Replacing the Tubeset

- 25.1 Press the release button and disconnect the tubeset from the manifolds on the mattress and the pump.
- 25.2 Reconnect the new tubeset making sure that the connections are secure at each end.

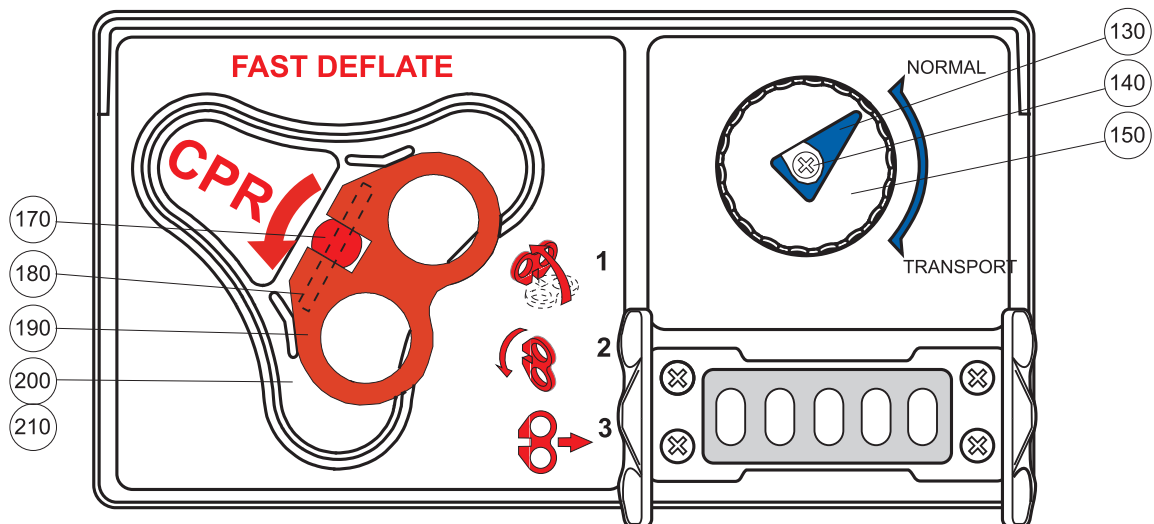
Table 28 - Mattress Parts List

Item	Part Number	Description	Qty
	650001DAR	Mattress Assembly Nimbus 4 Standard (Reliant IS ²)	1
	650001ADV	Mattress Assembly Nimbus 4 Standard (Glide IS ²)	
	650001EVE	Mattress Assembly Nimbus 4 Standard (Ventilate IS ²)	
	651001DAR	Mattress Assembly Nimbus Professional Standard (Reliant IS ²)	
	651001ADV	Mattress Assembly Nimbus Professional Standard (Glide IS ²)	
	651001EVE	Mattress Assembly Nimbus Professional Standard (Ventilate IS ²)	
	650201DAR	Mattress Assembly Nimbus 4 Narrow (Reliant IS ²)	
	650201ADV	Mattress Assembly Nimbus 4 Narrow (Glide IS ²)	
	650201EVE	Mattress Assembly Nimbus 4 Narrow (Ventilate IS ²)	
	651201DAR	Mattress Assembly Nimbus Professional Narrow (Reliant IS ²)	
	651201ADV	Mattress Assembly Nimbus Professional Narrow (Glide IS ²)	
	651201EVE	Mattress Assembly Nimbus Professional Narrow (Ventilate IS ²)	
	650082	Top Cover Standard - Nimbus 4 (Reliant IS ²)	1
	650080	Top Cover Standard - Nimbus 4 (Glide IS ²)	
	650084	Top Cover Standard - Nimbus 4 (Ventilate IS ²)	
	651082	Top Cover Standard - Nimbus Professional (Reliant IS ²)	
	651080	Top Cover Standard - Nimbus Professional (Glide IS ²)	
	651084	Top Cover Standard - Nimbus Professional (Ventilate IS ²)	
	650282	Top Cover Narrow - Nimbus 4 (Reliant IS ²)	
	650280	Top Cover Narrow - Nimbus 4 (Glide IS ²)	
	650284	Top Cover Narrow - Nimbus 4 (Ventilate IS ²)	
	651282	Top Cover Narrow - Nimbus Professional (Reliant IS ²)	
	651280	Top Cover Narrow - Nimbus Professional (Glide IS ²)	
	651284	Top Cover Narrow - Nimbus Professional (Ventilate IS ²)	
	650050	Base Cover Standard - Nimbus 4	1
	650250	Base Cover Narrow - Nimbus 4	
	651050	Base Cover Standard - Nimbus Professional	
	651250	Base Cover Narrow - Nimbus Professional	

Table 28 - Mattress Parts List

Item	Part Number	Description	Qty
	650070	Manifold Assembly - Nimbus 4	1
	651070	Manifold Assembly - Nimbus Professional	
	412072	Partial Non-Return Valve Assy	2
	627062	Cell Assembly - Short Standard	*
	627262	Cell Assembly - Short Narrow	*
	627061	Cell Assembly - Standard	*
	627261	Cell Assembly - Narrow	*
	152057	Cell Assembly - Standard	*
	237057	Cell Assembly - Narrow	*
	152140	Torso Cell - Standard	*
	627063	Cell Assembly - Torso Standard	*
	237140	Torso Cell - Narrow	*
	627263	Cell Assembly - Torso Narrow	*
	412073	Heel Protector	1
	PXB073	Base Cover Retaining Strap	8
	412068	Auto Matt Assembly	1
	650060	Loop Sheet Standard	1
	650260	Loop Sheet Narrow	1
	152404	Elastic Loop	15
	PXD333	Support Strap	5
	151200	5 Way Tubeset Assembly - Standard	1
	151201	5 Way Tubeset Assembly - 2.5 metre	
	151342	Tubeset Spring	4
	650316	Kit Bag	1
	650313	Vent Valve Knob	A/R
	412090	Link Manifold - Straight - Standard	2
	650290	Link Manifold - Straight - Narrow	
	412100	Link Manifold - Tee - Standard	1
	650291	Link Manifold - Tee - Narrow	
	627051	CPR Assembly	1

*Refer to Figure 33 for quantities.



Chap 6
Page 90

26 Replacing the CPR O-Rings

- 26.1 Remove the CPR Unit from the manifold mattress (Refer to Chapter 6, Page 83, Section 22).
- 26.2 Remove the screws (Fig 49, Item 10) and the backplate (Fig 49, Item 20) from the CPR Unit.
- 26.3 Replace the O-Ring (Fig 49, Item 50) on each connector as follows:
 - 26.3.1 Remove the connector (Fig 49, Item 30 or 40) from the hole in the front of the CPR Unit. The hoses can remain on the connector.
 - 26.3.2 Using a blunt electricians screwdriver or similar, carefully lift a section of the worn O-ring from its recess in the connector. Taking care not to damage the O-ring seat, ease the O-ring forward and off the connector.
 - 26.3.3 Replace the O-ring by carefully rolling along the connector until firmly seated in the recess.
 - 26.3.4 Install the connector back in the hole in the front of the CPR Unit.
- 26.4 Install the backplate (Fig 49, Item 20) over the Auto Matt hoses (Fig 49, Item 100) and the connectors (Fig 49, Items 30 and 40).
- 26.5 Install the screws (Fig 49, Item 10) to secure the backplate (Fig 49, Item 20) in position.
- 26.6 Install the CPR Unit to the manifold of the mattress (Refer to Chapter 6, Page 78, Section 14).

27 Replacing the Transport Assembly

- 27.1 Remove the CPR Unit from the manifold mattress (Refer to Chapter 6, Page 83, Section 22).
- 27.2 Carefully remove the triangular label (Fig 49, Item 130) from the centre of the transport knob (Fig 49, Item 150).
- 27.3 Remove the screw (Fig 49, Item 140) and the transport knob (Fig 49, Item 150) from the shaft.
- 27.4 Lay the CPR Unit face down on a firm surface and remove the screws (Fig 49, Item 10) and the backplate (Fig 49, Item 20) from the CPR Unit.
- 27.5 Disconnect the four hoses (Fig 49, Items 60, 70, 80 and 90) from the transport assembly (Fig 49, Item 110).
- 27.6 Remove the screws (Fig 49, Item 120) and the transport assembly (Fig 49, Item 110) from the CPR Unit.
- 27.7 Install the transport assembly (Fig 49, Item 110) into the CPR Unit in the orientation shown in Figure 49.
- 27.8 Install the screws (Fig 49, Item 120) to secure the transport assembly (Fig 49, Item 110).
- 27.9 Connect the four hoses (Fig 49, Items 60, 70, 80 and 90) from the transport assembly (Fig 49, Item 110).
- 27.10 Install the backplate (Fig 49, Item 20) over the Auto Matt hoses (Fig 49, Item 100) and the connectors (Fig 49, Items 30 and 40).
- 27.11 Install the screws (Fig 49, Item 10) to secure the backplate (Fig 49, Item 20) in position.
- 27.12 Install the CPR Unit to the manifold of the mattress (Refer to Chapter 6, Page 78, Section 14).

28 Repairing the CPR Handle Sub-Assembly

- 28.1 Remove the CPR Unit from the manifold mattress (Refer to Chapter 6, Page 83, Section 22).
- 28.2 Remove the screws (Fig 49, Item 10) and the backplate (Fig 49, Item 20) from the CPR Unit.
- 28.3 Remove the pin (Fig 49, Item 160) from inside the CPR Unit.

- 28.4 Remove the handle, the shaft, the pin, the cap and the spring (Fig 49, Items 190, 170, 180, 200 and 210).
- 28.5 If the handle (Fig 49, Item 190) or the shaft (Fig 49, Item 170) need to be replaced then they need to be replaced as a sub assembly together with the pin (Fig 49, Item 180).
- 28.6 If the new parts come disassembled, insert the cut away end of the shaft (Fig 49, Item 170) into the handle (Fig 49, Item 190) and install the pin (Fig 49, Item 180).
- 28.7 Insert the shaft (Fig 49, Item 170) into the cap (Fig 49, Item 200).
- 28.8 Place the spring (Fig 49, Item 210) into the shaped recess on the inside of the cap (Fig 49, Item 200).
- 28.9 Carefully, holding the spring in position against the inside of the cap, position the other end of the spring into the shaped recess on the front of the CPR Unit.
- 28.10 Making sure that the spring does not come out of the recesses, locate the shaft of the cap into the hole in the CPR Unit.
- 28.11 Holding the back of the CPR Unit, push the cap towards the CPR Unit, rotate the cap clockwise, and insert the cap into the shape of the CPR Unit. Lay the CPR Unit face down and hold the CPR handle sub-assembly in position.
- 28.12 Push each connector (Fig 49, Items 30 and 40) down to locate the O-Rings into the cap.
- 28.13 Insert the pin (Fig 49, Item 160) through the end of the shaft (Fig 49, Item 170). Centre the pin so that equal amounts are either side of the shaft.
- 28.14 Install the backplate (Fig 49, Item 20) over the Auto Matt hoses (Fig 49, Item 100) and the connectors (Fig 49, Items 30 and 40).
- 28.15 Install the screws (Fig 49, Item 10) to secure the backplate (Fig 49, Item 20) in position.
- 28.16 Install the CPR Unit to the manifold of the mattress (Refer to Chapter 6, Page 78, Section 14).

29 Replacing the CPR Manifold Gasket

29.1 Carefully remove the screws (Fig 50, Item 220).

Note: Do not apply pressure on the screws when removing. If pressure is applied, the brass inserts can be pushed out of the case, inside the CPR Unit. If a brass insert is lost inside the case, the backplate must be removed to retrieve it.

29.2 Remove the manifold outer (Fig 50, Item 230) and the manifold gasket (Fig 50, Item 240). The manifold inner (Fig 50, Item 250) will remain connected to the hoses inside the CPR Unit.

29.3 Install the new manifold gasket (Fig 50, Item 240) and the manifold outer (Fig 50, Item 230) to the manifold inner (Fig 50, Item 250).

29.4 Carefully install the screws (Fig 50, Item 220). Make sure the screws are correctly threaded into the brass inserts before applying pressure to tighten.

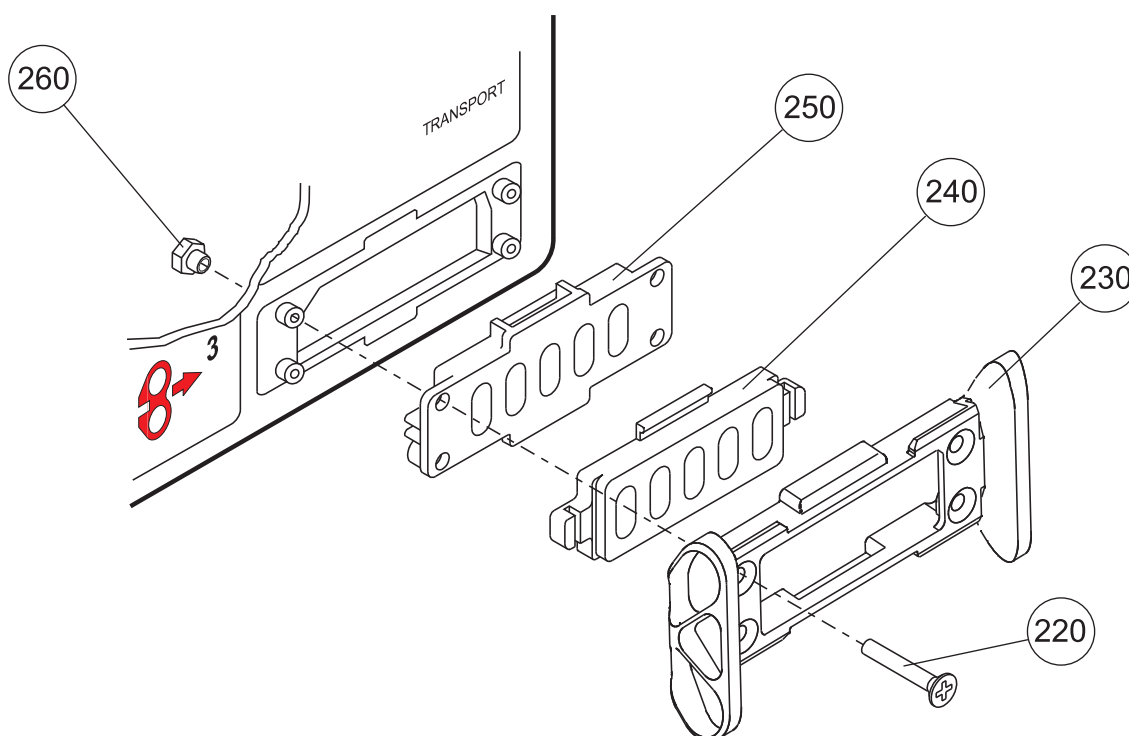


Figure 50 - Replacing the CPR Manifold Gasket

Table 29 - CPR Unit Component Parts List

Item	Part Number	Description	Qty
REF	627051	CPR Assembly - All variants	1
10	FAS180	Screw 3mm DIA x 12mm Pozi	6
30	152319	Connector	1
40	152332	Connector	1
50	152341	O-Ring Seal	1
60	152079	Hose CPR Air Inlet Long	1
70	152136	Hose 44mm ±2mm	1
80	152334	Hose 100mm ±2mm	1
90	152356	Hose CPR Air Inlet Short	1
100	152136	Hose 100mm ±2mm	2
110	152399	Transport Assembly	1
120	FAS145	Screw 3mm DIA x 8 Pozi Pan Head PT	2
130	152308	Transport Knob Label	1
140	FAS189	Screw M3 x 6mm C'SK Head Pozi	1
150	152322	Transport Knob	1
160	FAS192	Pin 3 x 24 LG MDP	1
170	152330	Shaft CPR Handle	1
180	FAS192	Pin 3 x 24 LG MDP	1
190	152331	Handle CPR Pull	1
200	152321	Cap CPR Body	1
210	152320	Spring CPR	1
220	FAS041	Screw M3 x 20mm C'SK Pozi	4
230	151471	Connector Manifold Braced Blue	1
240	151304	Gasket 5 Way Manifold	1
250	151480	Manifold 5 Way Barbed	1
260	BP024	Brass Threaded Insert	4

30 Removing the Knob from the Vent Valve

- 30.1 Remove the top cover (Refer to Chapter 6, Page 69, Section 2).
- 30.2 On the Cell attached to the relevant vent valve, pull apart the pop stud (Fig 52, Item 20) which secures the top of the Cell (Fig 52, Item 30) to the Base Cover Assembly (Fig 52, Item 40).
- 30.3 Make sure that the Vent Valve is in the fully closed position (Refer to Figure 51).

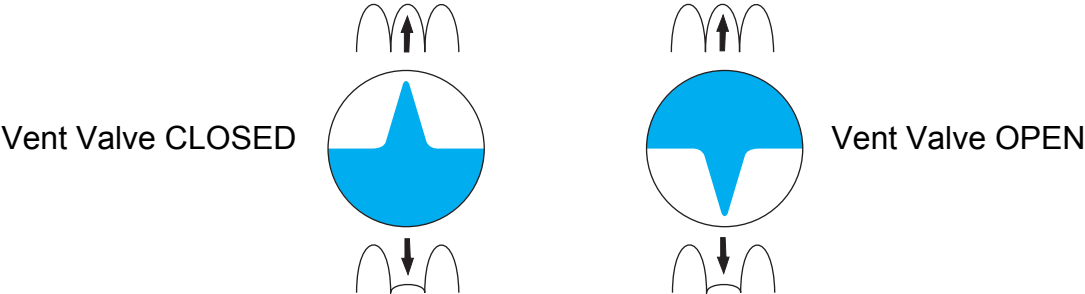


Figure 51 - Vent Valve Positions

- 30.4 To remove the Knob from the Vent Valve body, carry out the following procedure (Refer to Figure 52):
 - 30.4.1 Hold the Vent Valve Knob (Fig 52, Item 10) with one hand, gripping it at the 3 o'clock and 9 o'clock positions. Hold the Cell (Fig 52, Item 30) with the other hand.
 - 30.4.2 Tilt the Knob, lifting the 9 o'clock position and depressing the 3 o'clock position. The Knob will unclip from the valve and can be lifted away.

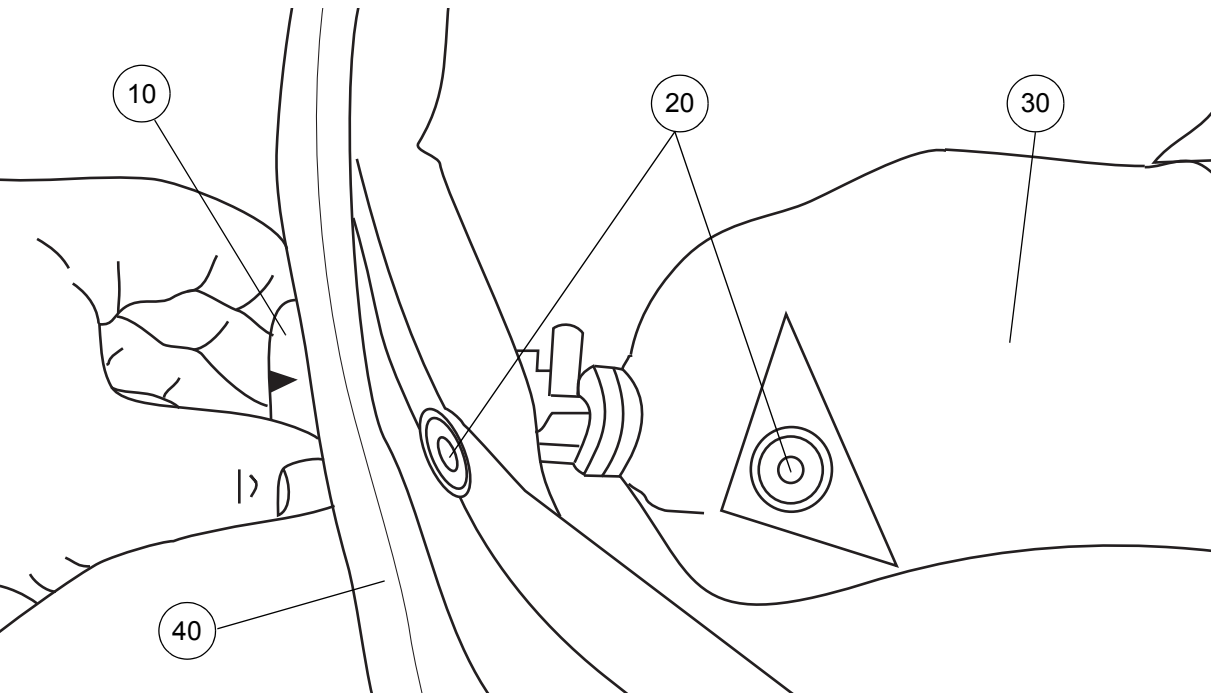


Figure 52 - Removing a Vent Valve from the Cell connection









Item	Part Number	Description	Qty
10	650313	Vent Valve Knob - Refer to Figure 33	-

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CHAPTER 7

TECHNICAL SPECIFICATION

PUMP				
Model:	Nimbus 4/ Nimbus Professional			
Input Voltage and Frequency:	Part No.	Marking:	Territory	Input Voltage and Frequency
	649003		USA	120 V / 60 Hz
	649010 649012 649014 649015 649017 649019 649020 649028	649STD	UK German Euro French Italian Swiss Dutch Australian	230 V / 50 Hz
	649031		India	230 V / 50 Hz
	649023		KSA	230 V / 60 Hz
Power Input:	35 VA			
Size:	508 x 220 x 100 mm (20.0 x 8.7 x 4.0")			
Weight:	5.7 kg (12.5 lb)			
Case Material:	ABS Fire retardant UL 94 V-0 rated			
Plug Fuse Rating:	5A to BS1362 (UK ONLY)			
Pump Fuse Rating:	2 x F500 mA H 250 V			
Degree of protection against electric shock:	Mains Connected - Class 1 Protective earth Type BF.			
Degree of protection of ingress of liquids:	IP21			
Air Filter inlet:	Service replaceable			
Operating Cycle:	10 minutes			
Mode of operation:	Continuous			

PUMP SYMBOLS					
	The operator must read this document (Instructions for Use) before use. Note: This symbol is blue on the product label.	O (Off)	Power Disconnects from the mains supply		Do not dispose of in domestic refuse
	With respect to electric shock, fire and mechanical hazards only in accordance with CAN/CSA-C22.2 No. 60601.1 (2008). MEDICAL EQUIPMENT	I (On)	Power Connects to the mains supply		Type BF
	Refer to this document (Instructions for Use) for a description of the product classification (3rd Edition).	SN:	Serial Number	Ref:	Model number
	Refer to this document (Instructions for Use) for a description of the product classification (2nd Edition).		Double Insulated		Manufacturer: This symbol is accompanied by the name and the address of the manufacturer.

PUMP ENVIRONMENTAL INFORMATION			
Condition	Temperature Range	Relative Humidity	Atmospheric Pressure
Operating	+10°C to +40°C (+50°F to +104°F)	30% to 75% (non-condensing)	700hPa to 1060 hPa
Storage (Long Term)	+10°C to +40°C (+50°F to +104°F)	20% to 95% (non-condensing)	700 hPa to 1060 hPa
Storage (Short Term)	-20°C to +50°C (-4°F to +122°F)	20% to 95% (non-condensing)	500 hPa to 1060 hPa
Note: If the pump is stored in conditions outside the “Operating” ranges, allow time for its temperature to stabilise to normal, before use.			
Note: One of the effects of prolonged exposure to high temperatures is to increase the self-discharge of the internal battery; this will reduce the duration of power fail alarms. The pump will fully charge the battery over a 24-hour period when the pump is connected to a mains power supply.			

ACCESSORIES

Part:	Tube Set	
Part Number:	151200	151201
Length:	1000 mm (39.4")	2500 mm (98.4")
Materials:	Tube: 5-way moulded PVC Connectors: Moulded Nylon	







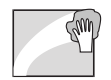

MATTRESS SPECIFICATION

<i>Nimbus 4</i>	Standard Width	Narrow Width
Reliant IS² Standard Cover	650001DAR	650201DAR
Glide IS² Cover	650001ADV	650201ADV
Ventilate IS² Fabric Cover	650001EVE	650201EVE
Length	2085 mm (82")	
Height:	215 mm (8.5")	
Width:	890 mm (35")	800 mm (31.5")
Weight:	11.5 kg (25.3 lb.)	10.3 kg (22.7 lb.)
Cell Material:	Polyurethane	
Base Material:	PU Coated Polyester	
Top Cover Material:	PU Coated Fabric or Glide IS² or Ventilate IS² Fabric	
<i>Nimbus Professional</i>	Standard Width	Narrow Width
Reliant IS² Standard Cover	651001DAR	651201DAR
Glide IS² Cover	651001ADV	651201ADV
Ventilate IS² Fabric Cover	651001EVE	651201EVE
Length	2085 mm (82")	
Height:	215 mm (8.5")	
Width:	890 mm (35")	800 mm (31.5")
Weight:	15.5 kg (34.1 lb.)	14.3 kg (31.5 lb.)
Cell Material:	Polyurethane	
Base Material:	PU Coated Nylon	
Top Cover Material:	PU Coated Fabric or Glide IS² or Ventilate IS² Fabric	

COVER SPECIFICATION			
Feature	Standard Cover (Reliant IS ²)	Glide IS ²	Ventilate IS ²
Removable Cover	Yes	Yes	Yes
Moisture Vapour Permeable	Low	Low	High
Low Friction	No	Yes	Yes
Water Resistant / Repellent	Yes	Yes	Yes
Polyurethane coating includes an antimicrobial agent to control microbial deterioration of fabric	Yes	Yes	Yes
Fire Retardant ^(a)	BS 7175: 0,1 & 5	BS 7175: 0,1 & 5	BS 7175: 0
2-Way Stretch	Yes	Some	No
Recommended Wash Temperatures	60°C (140°F) 15 min.	60°C (140°F) 15 min.	60°C (140°F) 15 min.
Maximum Wash Temperatures	Max 95°C (203°F) 15 min.	Max 95°C (203°F) 15 min.	Max 60°C (140°F) 15 min.
Recommended Drying Temperatures	60°C (140°F) or air dry	Tumble dry only at 60°C (140°F)	60°C (140°F) or air dry
Max Drying Temperatures	Max 80°C (176°F)	Max 80°C (176°F)	Max 60°C (140°F)
Wipedown Chemicals ^(b)	Chlorine at strength of 1000ppm or Alcohol at 70% concentration; no phenol; ensure product is dry before storage	Chlorine at strength of 1000ppm or Alcohol at 70% concentration; no phenol; ensure product is dry before storage	Chlorine at strength of 1000ppm or Alcohol at 70% concentration; no phenol; ensure product is dry before storage

- a. For additional flammability testing standards, refer to individual product law tags, if applicable
- b. Chlorine concentrations may vary from 250ppm to 10,000ppm depending on local policy and contamination status. If an alternative disinfectant is selected from the wide variety available, ArjoHuntleigh recommend that suitability for use is

MATTRESS CLEANING SYMBOLS

	Recommended wash temperature: 15 min at 60°C (140°F) Maximum wash temperature: 15 min at 95°C (203°F)		Tumble dry at 60°C (140°F) Maximum drying temperature: 80°C (176°F)
	Recommended wash temperature: 15 min at 60°C (140°F)		Tumble dry at 60°C (140°F)
	Do not iron		Do Not Use Phenol-based cleaning Solutions
	Wipe surfaces with cleaning solution, then wipe with a cloth moistened with water and dry thoroughly		Use solution diluted to 1000 ppm of Available Chlorine


Guidance and manufacturer's declaration - electromagnetic emissions

The pump is intended for use in the electromagnetic environment specified below. The customer or the user of the pump should assure that it is used in such an environment.

Emissions Test	Compliance	Electromagnetic environment - guidance
RF emissions CISPR - 11	Group 1	The pump uses RF energy only for its internal function. therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment. The pump is suitable for use in all establishments other than domestic and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
RF emissions CISPR - 11	Class A (non-homecare) Class B (homecare)	
Harmonic emissions	Class A	
Voltage fluctuations/ flicker emissions IEC 61000-3-2	Complies	

Guidance and manufacturer's declaration - electromagnetic immunity

The pump is intended for use in the electromagnetic environment specified below. The customer or the user of the pump should assure that it is used in such an environment.

Immunity Test	IEC 60601 Test Level	Compliance Level	Electromagnetic environment - guidance
Conducted RF IEC 61000-4-6	3 Vrms 150 kHz to 80 MHz	3 V	Portable and mobile RF communications equipment should be used no closer to any part of the pump, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. Recommended separation distance $d = 1.2\sqrt{P}$ $d = 1.2\sqrt{P}$ 80 MHz to 800 MHz $d = 2.3\sqrt{P}$ 800 MHz to 2.5 GHz
Radiated RF IEC 61000-4-3	3 V/m 80 MHz to 2.5GHz	3 V/m	where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in metres (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey ^a , should be less than the compliance level in each frequency range. ^b Interference may occur in the vicinity of equipment marked with the following symbol: 

Note: At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.

Note: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

^a Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the pump is used exceeds the applicable RF compliance level above, the pump should be observed to verify normal operation. If abnormal operation is observed, additional measures may be necessary, such as reorientating or relocating the pump.

^b Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m.

Recommended separation distances between portable and mobile RF communications equipment and the pump

The pump is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the pump can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the pump as recommended below, according to the maximum output power of the communications equipment.

Rated maximum output power of transmitter W	Separation distance according to frequency of transmitter m		
	150 kHz to 80 MHz $d = 1.2\sqrt{P}$	80 MHz to 800 MHz $d = 1.2\sqrt{P}$	800 MHz to 2.5 GHz $d = 2.3\sqrt{P}$
0.01	0.12	0.12	0.23
0.1	0.38	0.38	0.73
1	1.2	1.2	2.3
10	2.8	3.8	7.3
100	12	12	23

For transmitters rated at a maximum output power not listed above, the recommended separation distance d in metres (m) can be estimated using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

Note: At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.

Note: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

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CHAPTER 8

PARTS LIST

1 Pump Assembly Parts List

Part Number	Description	Fig - Item	Qty
649003	Nimbus Pump Assembly USA 120 V 60 Hz	-	1
649010	Nimbus Pump Assembly UK 220 - 240 V 50 Hz	-	1
649012	Nimbus Pump Assembly German 220 - 240 V 50 Hz	-	1
649014	Nimbus Pump Assembly Euro 220 - 240 V 50 Hz	-	1
649015	Nimbus Pump Assembly French 220 - 240 V 50 Hz	-	1
649017	Nimbus Pump Assembly Italian 220 - 240 V 50 Hz	-	1
649019	Nimbus Pump Assembly Swiss 220 - 240 V 50 Hz		1
649020	Nimbus Pump Assembly Dutch 220 - 240 V 50 Hz	-	1
649023	Nimbus Pump Assembly KSA 230 V 60 Hz	-	1
649028	Nimbus Pump Assembly Australian 220 - 240 V 50 Hz	-	1
649031	Nimbus Pump Assembly India 230 V 50Hz	-	1

Front and Rear Cases

649052	Rear Case Assembly	8-10	1
649302	• Rear Case	9-10	1
151311	• Filter Housing Plate	9-20	2
151312	• Filter Felt	9-30	1
FAS179	• Screw, 2.5mm (dia) x 10mm Pan Head	9-40	6
507413	• Rubber Foot	8-50	8
649301	Front Case	8-20	1
151105	Neoprene Sponge Cord, Length 1.34m, Dia 2mm	8-40	1
FAS188	Screw, M4 x 30mm Pan Head	8-30	8
649123	Hanging Bracket	7-10	1
151427	• Bracket	7-20	1
649428	• Wire	7-30	1
FAS046	• Screw	7-40	2
FAS216	• Nut M3 x 0.5 Euro Series	7-50	2

Part Number	Description	Fig - Item	Qty
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Label Sets

LAB302	Rear label set - pump serial numbers earlier than 1200026486		1
LAB701	Rear label set - pump serial numbers 1200026486 to current		1

Double Compressor Assembly

165076	Double Compressor Assembly - 220 V 50 Hz (UK, Euro)	10-10	1
165074	Double Compressor Assembly - 120 V 60 Hz (USA)	10-10	1
165095	Double Compressor Assembly - 230 V 60 Hz (KSA)	10-10	1
165311	• Compressor Lid Casting	10-20	2
165312	• Compressor Lid Gasket	10-30	2
165054	• Shuttle Assembly - 63 Shore (UK, EURO 50Hz)	12-10	2
165092	• Shuttle Assembly - 70 Shore (USA 60Hz)	12-10	2
165058	• Coil (pair) 240V (UK, EURO)	12-70	2
165107	• Coil (pair) 100V (USA)	12-70	2
REF	• Coil (pair) 230V (KSA)	12-70	2
165314	• Compressor Filter Lid	11-70	8
165313	• Compressor Filter	11-80	8
165310	• Bump Stop	11-30	4
165324	• Bump Stop Plate	11-40	2
165300	• Grommet - Lead Through	10-40	4
165303	• Grommet - Lead Through	10-45 12-80	4 4
165306	• Outlet Tube	12-20	8
FAS051	• Screw, M4 x 6mm Pan Head	11-10	4
FAS177	• Screw, M4 x 8mm Csk Head	10-50 11-50	8 4
FAS193	• Screw, M3 x 5mm Pan Head	11-60	8
FAS160	• Washer, M4 Plain	11-20	4
FAS206	• Washer, Belleville Serrated Safety	12-60	8
FAS207	• Washer, Disk Spring (ID 4.2mm, OD 10mm)	12-40	8
151364	AV Mount	10-170	4
151310	Compressor Mounting Bracket	10-130	2

Part Number	Description	Fig - Item	Qty
151386	P-Clip, No. 6	10-110	3
FAS093	Screw, M4 x 12mm Pan Head	10-80	2
FAS095	Screw, M4 x 10mm Pan Head	10-120	4
FAS144	Nut, M4 Full	10-60	2
FAS178	Nut, 8/32 UNC	10-140	8
FAS053	Washer, M4 Anti-Vibration	10-70	2
		10-90	2
		10-160	2
FAS160	Washer, M4 Plain	10-100	2
		10-150	6
BP196	Cable Tie	10-180	A/R

Rotary Valve Assembly, Pressure Control Assembly and High Pressure Switch

151155	Rotary Valve Assembly 120 V / 60 Hz	14-10	1
151128	Rotary Valve Assembly (240 V / 50 Hz)	14-10	1
151059	Pressure Control Assembly	21-10	1
151305	Pressure Control Knob	21-40	1
649327	Pressure Control Label	21-50	1
198394	High Pressure Switch	22-10	1
151348	Pillar, M3 x 30mm	14-40	2
FAS043	Screw, M3 x 6mm Pan Head	14-20,	2
		21-20	4
FAS182	Screw, 3 (dia) x 20mm Pan Head	22-20	2
FAS002	Washer, 6BA Anti-Vibration	14-30	2
		21-30	4
BP196	Cable Tie	14-50	A/R

Display Panel PCB and Front Panel

151550/ 649306	Display Panel PCB Assembly 240V (UK, EURO)	15-10	1
151549/ 649305	Display Panel PCB Assembly 120V (USA 60Hz)	15-10	1
630600	Battery, Rechargeable	25-10	1
063703	Battery, Rechargeable	25-20	1
649601	Front Panel Assembly (All variants)	18-60	1
151105	Seal Ring	18-60	1
FAS098	Nut, M3 Full	15-20	8

Part Number	Description	Fig - Item	Qty
FAS002	Washer, 6BA Anti-Vibration	15-40	1
FAS091	Washer, M3 Nylon	15-30	7
FAS145	Screw, 3 (dia) x 8mm Pan Head	18-70	13
151309	Front Panel Fixing Cap	18-80	13
151352	Spacer, 8.5 (long) x 3.2 x 6mm	15-50	8

Mains/Power Items

15180 649319	Mains/Power Inlet Socket	19-10	1
CAS024	• Fuse, 20 x 5mm, 500mA	20-20	1
BP605	Fuseholder Assembly - Neutral (Black)	20-10	1
CAB303 CAB303HC	Mains/Power Cable (Euro, Dutch, French, German, Italian, KSA)	19-40	1
CAB305 CAB305HC	Mains/Power Cable (UK)	19-40	1
CAB306 CAB306HC	Mains/Power Cable (USA)	19-40	1
CAB307 CAB307HC	Mains/Power Cable (Australian)	19-40	1
CAB308	Mains/Power Cable (Swiss)	19-40	1
BP196	Cable Tie	30	A/R
CAB330	Mains/Power Cable (India)	-	1

5-way Manifold

151480	5-way Barbed Manifold	13-10	1
151304	5-way Manifold Gasket	13-20	1
151471	Connector Manifold Braced Blue	13-30	1
FAS196	Screw, M3 x 20mm Csk Head	13-50	2
FAS233	Screw, M3 x 16mm Csk Head	13-40	4
FAS098	Nut, M3 Full	13-60	4
VIB004	Grommet	13-70	4
197312	Nut, M3 Dome Plastic	13-80	4

Silencer Bag, Bio Filter and Tubes

151098	Silencer Bag Assembly	23-30	1
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Part Number		Description	Fig - Item	Qty
151450	Bio Filter		24-10	1
151444	Bio Filter Label		24-20	1
SW393	Silicone Tube, Blue, ID 6mm OD 10mm		23-10, 24-30	A/R
BP196	Cable Tie		24-	A/R
Tools				
MIS155	Spacer saddle gauge set - not shown (5 gauges A to E)		12-90	1

2 Mattress Assembly Parts List

Part Number	Description	Fig - Item	Qty
650001DAR	Mattress Assembly Standard Reliant IS ² - Nimbus 4	29	1
650001ADV	Mattress Assembly Standard Glide IS ² - Nimbus 4	29	1
650001EVE	Mattress Assembly Standard Ventilate IS ² - Nimbus 4	29	1
650201DAR	Mattress Assembly Narrow Reliant IS ² - Nimbus 4	29	1
650201ADV	Mattress Assembly Narrow Glide IS ² - Nimbus 4	29	1
650201EVE	Mattress Assembly Narrow Ventilate IS ² - Nimbus 4	29	1
651001DAR	Mattress Assembly Standard Reliant IS ² - Nimbus Professional	29	1
651001ADV	Mattress Assembly Standard Glide IS ² - Nimbus Professional	29	1
651001EVE	Mattress Assembly Standard Ventilate IS ² - Nimbus Professional	29	1
651201DAR	Mattress Assembly Narrow Reliant IS ² - Nimbus Professional	29	1
651201ADV	Mattress Assembly Narrow Glide IS ² - Nimbus Professional	29	1
651201EVE	Mattress Assembly Narrow Ventilate IS ² - Nimbus Professional	29	1
650082	Top Cover Assembly Standard Reliant IS ² - Nimbus 4		1
650080	Top Cover Assembly Standard Glide IS ² - Nimbus 4		1
650084	Top Cover Assembly Standard Ventilate IS ² - Nimbus 4		1
650282	Top Cover Assembly Narrow Reliant IS ² - Nimbus 4		1
650280	Top Cover Assembly Narrow Glide IS ² - Nimbus 4		1
650284	Top Cover Assembly Narrow Ventilate IS ² - Nimbus 4		1
651082	Top Cover Assembly Standard Reliant IS ² - Nimbus Professional		1
651080	Top Cover Assembly Standard Glide IS ² - Nimbus Professional		1
651084	Top Cover Assembly Standard Ventilate IS ² - Nimbus Professional		1
651282	Top Cover Assembly Narrow Reliant IS ² - Nimbus Professional		1
651280	Top Cover Assembly Narrow Glide IS ² - Nimbus Professional		1
651284	Top Cover Assembly Narrow Ventilate IS ² - Nimbus Professional		1
650050	Base Cover Standard - Nimbus 4	27-10	1
650250	Base Cover Narrow - Nimbus 4	27-10	1
651050	Base Cover Standard - Nimbus Professional	27-10	1

Part Number	Description	Fig - Item	Qty
651250	Base Cover Narrow - Nimbus Professional	27-10	1
650070	Manifold Assembly - Nimbus 4		1
651070	Manifold Assembly - Nimbus Professional		1
650313	Vent Valve Knob	52-10	15
412072	Partial Non Return Valve	33-10	2
627061	Cell Assembly - Standard	29	*
627261	Cell Assembly - Narrow	29	*
627062	Cell Assembly - Short Standard	29	*
237057	Cell Assembly - Short Narrow	29	*
627063	Cell Assembly - Torso Standard	29	*
627263	Cell Assembly - Torso Narrow	29	*
152140	Torso Cell - Standard	29	*
237140	Torso Cell - Narrow	29	*
412073	Heel Protector	23-20	1
PXB073	Base Cover Retaining Strap		8
412068	Auto Matt Assembly	36-20	1
650060	Loop Sheet Standard		1
650260	Loop Sheet Narrow		1
152404	Elastic Loop - Nimbus 4 & Professional	39-20	15
PXD333	Support Board	39-10	5
152409	Kit Bag - Nimbus 4 & Professional		1
412090	Link Manifold Straight Standard		2
650290	Link Manifold Straight Narrow		2
412100	Link Manifold Tee Standard	36-40	1
650291	Link Manifold Tee Narrow	32-40	1

*Refer to Figure 33 for quantities.

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