

ALPHA RESPONSE™  
Service Manual

ARJOHUNTLEIGH  
GETINGE GROUP





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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 the maintenance, servicing, repair, troubleshooting and testing for the **Alpha RESPONSE™** System. Refer to “Effectivity” on page 2 for a list of all **Alpha RESPONSE** models and part numbers included in this manual.

***Read and understand this manual before attempting to service or repair the equipment.***

#### Numbering and Cross-Referencing in this Manual

For all chapters in this manual:

- Section and paragraph numbering re-start at “1”.
- Page, 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.

### 2 General

#### Regulatory

The **Alpha RESPONSE** system has been designed to comply with regulatory safety standards including:

- EN60601-1:1990/A13:1996 and IEC 60601-1:1988/A2:1995.
- UL60601-1 and CAN/CSA C22.2 No. 601.1-M90.

#### Precautions

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

- Do not expose the system, especially the mattress, to naked flames, such as cigarettes, etc.
- Do not store the system in direct sunlight.
- Do not use phenol-based solutions to clean the system.
- Make sure the system is clean and dry prior to use or storage.
- Never use sharp objects or electrically heated under blankets on or under the system.
- Store the pump and mattress or seat cushion in protective bags.

#### 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.

## Design Policy and Copyright

® and ™ are trademarks belonging to the ArjoHuntleigh group of companies. As our policy is one of continuous improvement, we reserve the right to modify designs without prior notice.

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## 3 About the *Alpha* RESPONSE System

### General

The **Alpha RESPONSE** system is a pressure redistributing mattress replacement, mattress overlay or seat cushion system designed to complement pressure ulcer treatment and prevention protocols. The product offers two therapeutic modes:

- **Active<sup>1</sup> (Alternating)** mode which periodically redistributes pressure away from vulnerable areas by inflating and deflating the cells beneath the body every 10 minutes.
- **Reactive<sup>1</sup> (Constant Lower Pressure or CLP)** mode where the cell pressure is reduced and held constant across the surface in order to lower the pressure exerted on the body.

The product also offers an additional option, **Transport Mode**, where therapy is interrupted and the mattress cells become static in order to assist with patient transport.

The mattresses 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. The seat cushion can be used on standard hospital and normal domestic chairs.

The pump has three settings for the patient weight range:

- Light: 40 - 70 kg (88 - 154 lb).
- Normal: 70 - 120 kg (154 - 265 lb).
- Heavy: 120 - 160 kg (265 - 353 lb).

The pump will automatically detect whether a mattress or seat cushion is connected.

### System Variants

If the backrest on the bed is raised (the patient is in a semi-recumbent position), the pressure in the mattress is increased to provide optimal pressure redistribution to the patient. There are two variants of the **Alpha RESPONSE** system, depending on how the system detects the position of the backrest and increases the mattress pressure:

- On UK, Euro and RoW systems (except the USA), the system automatically detects the new backrest position and increases the pressure in the mattress cells.
- On USA-only systems, the clinician (or patient) has to manually select the **Backrest Raised** mode on the pump which will increase the pressure in the mattress cells.

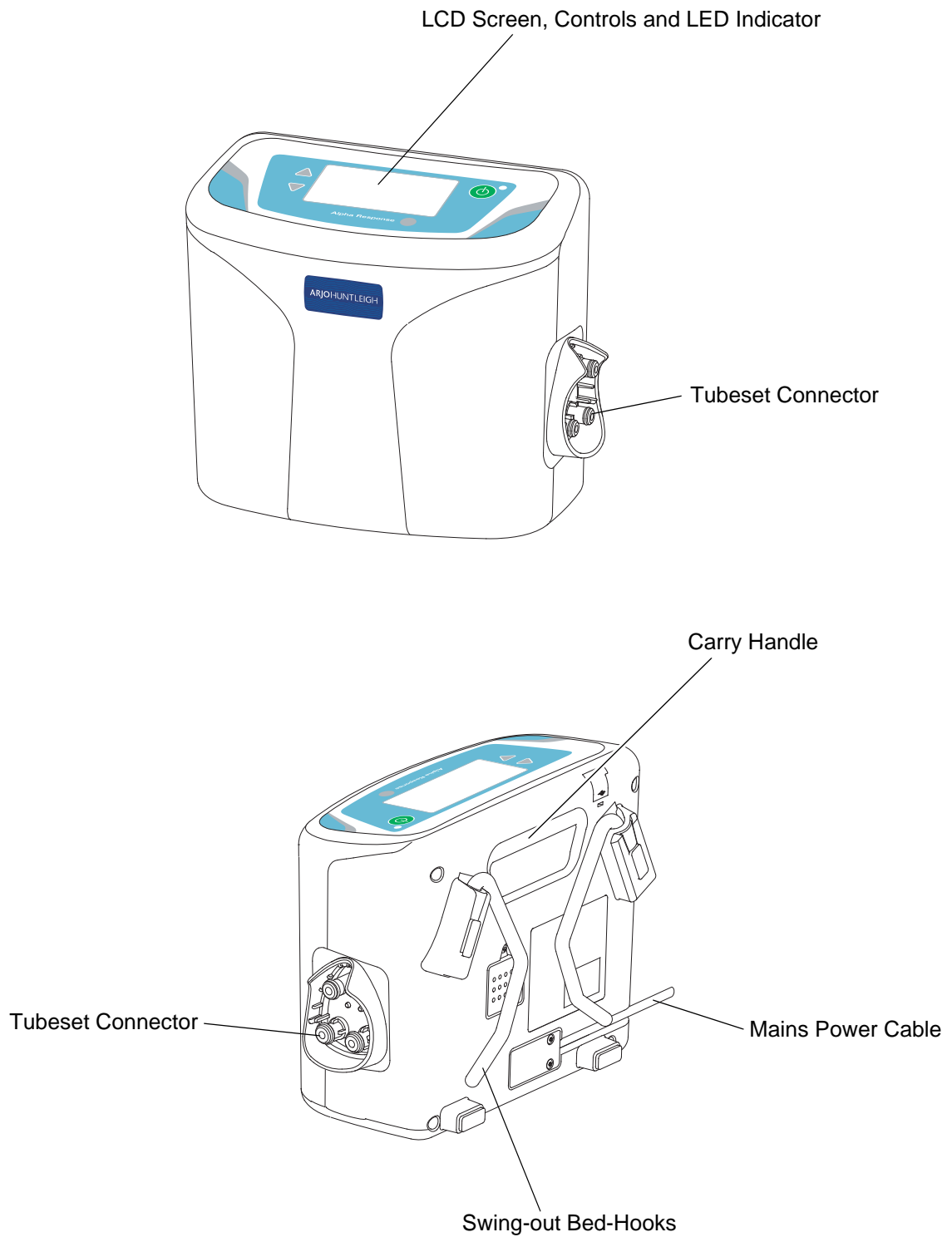
## 4 Effectivity

- This manual applies to all variants of the **Alpha RESPONSE** systems, comprising a pump and mattress (replacement or overlay) or seat cushion; both variants of pumps, as detailed in "System Variants" on page 2, are detailed in this manual.
- Refer to Chapter 9 "Parts List", Page 97, "Overall Assembly Parts List" for a detailed list of all the assemblies covered by this service manual.

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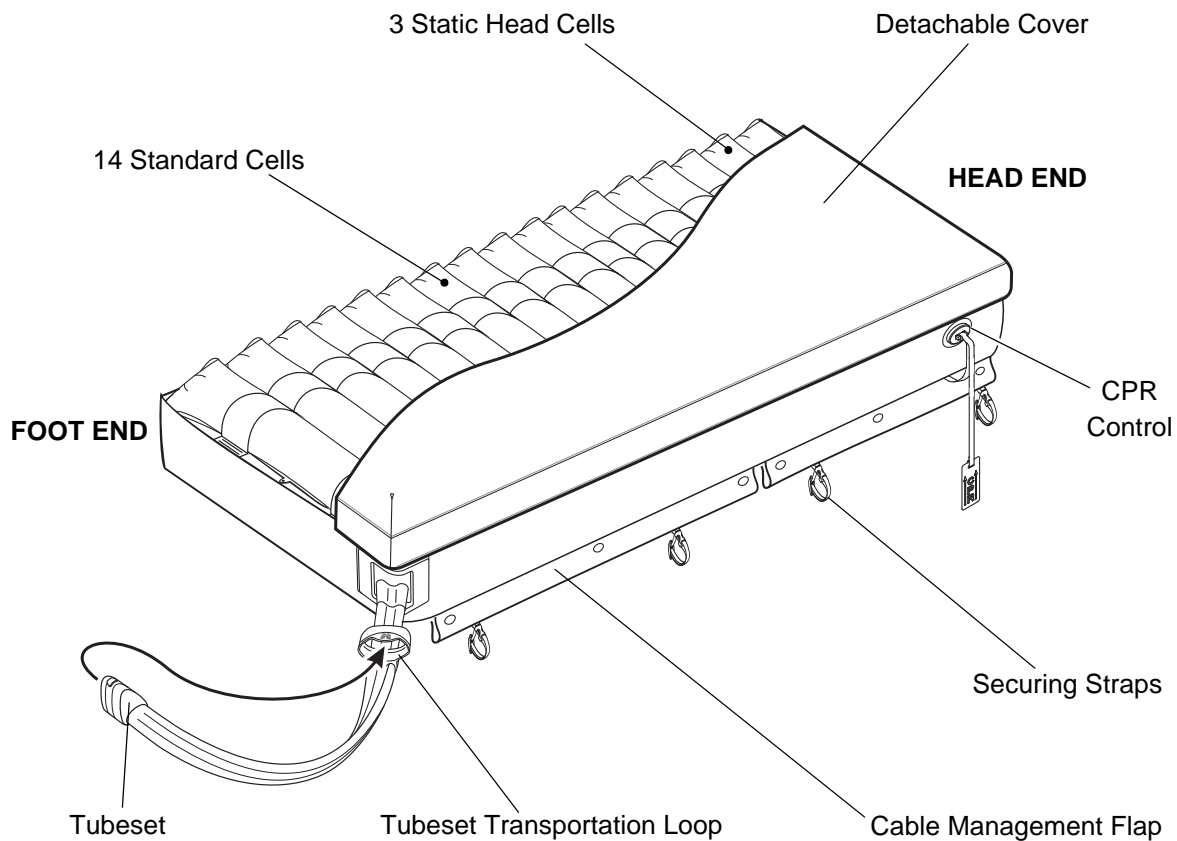
1. International Pressure Ulcer Prevention and Treatment Guideline (2009). [www.epuap.org](http://www.epuap.org)

## 5 Pump



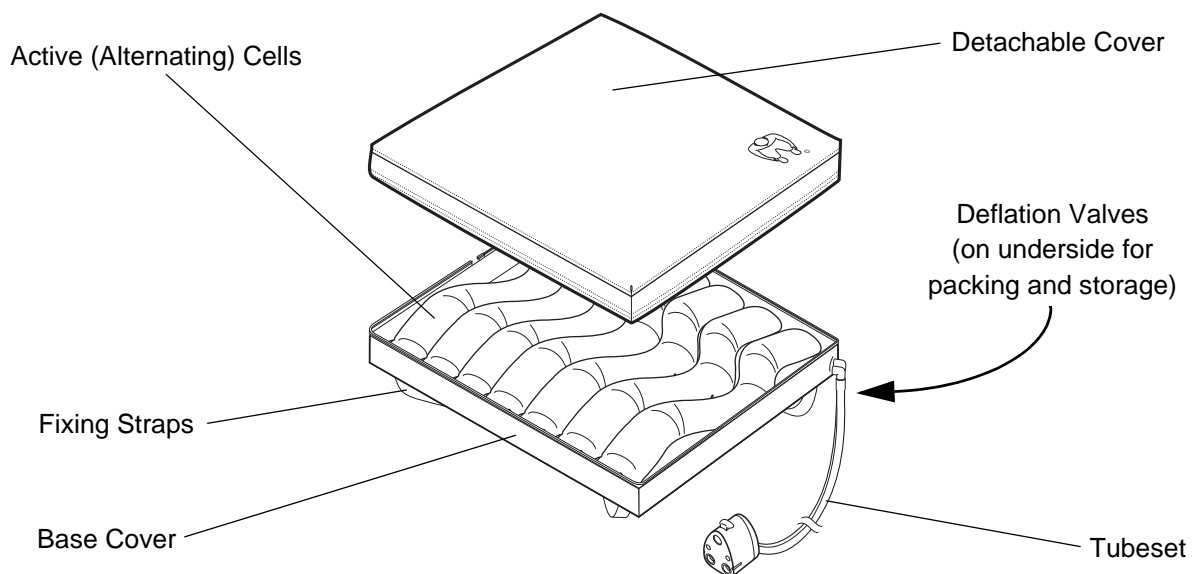
**Figure 1 - Pump - Front and Rear Views**

## 6 Mattress Replacement and Mattress Overlay



**Figure 2 - Mattress - Replacement and Overlay**

## 7 Seat Cushion



**Figure 3 - Seat Cushion**

8 Pump Schematics

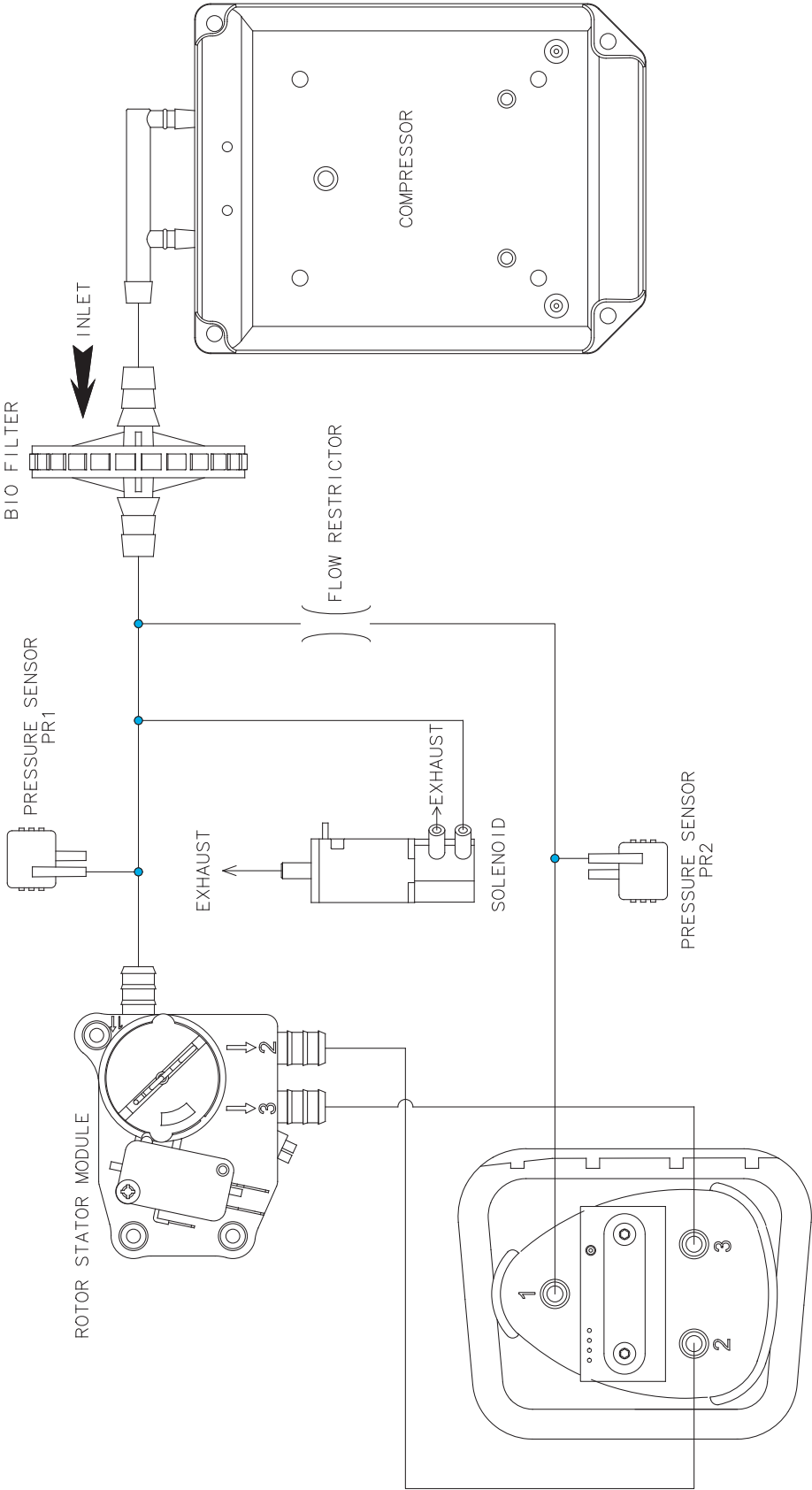


Figure 4 - Pneumatic Schematic

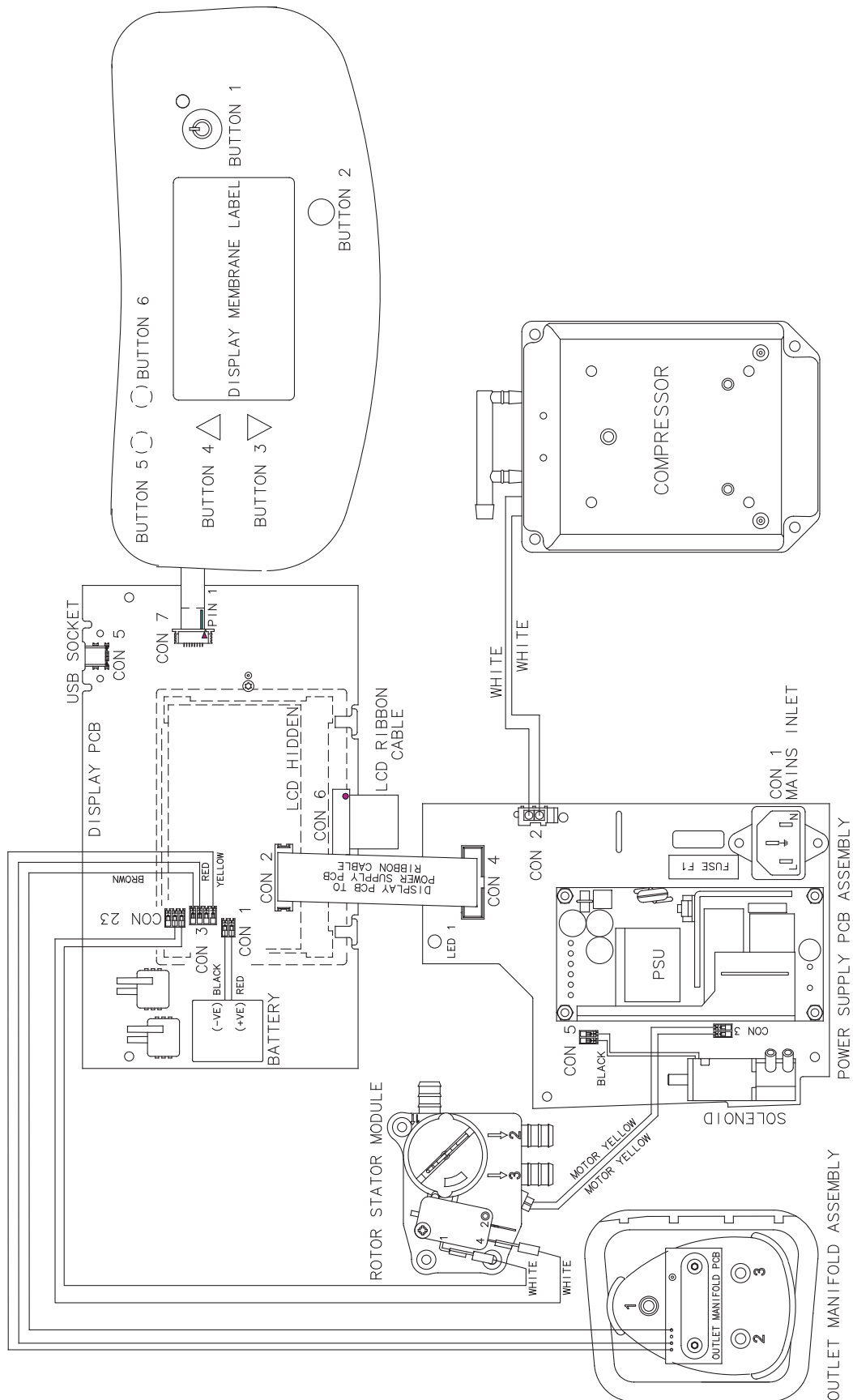
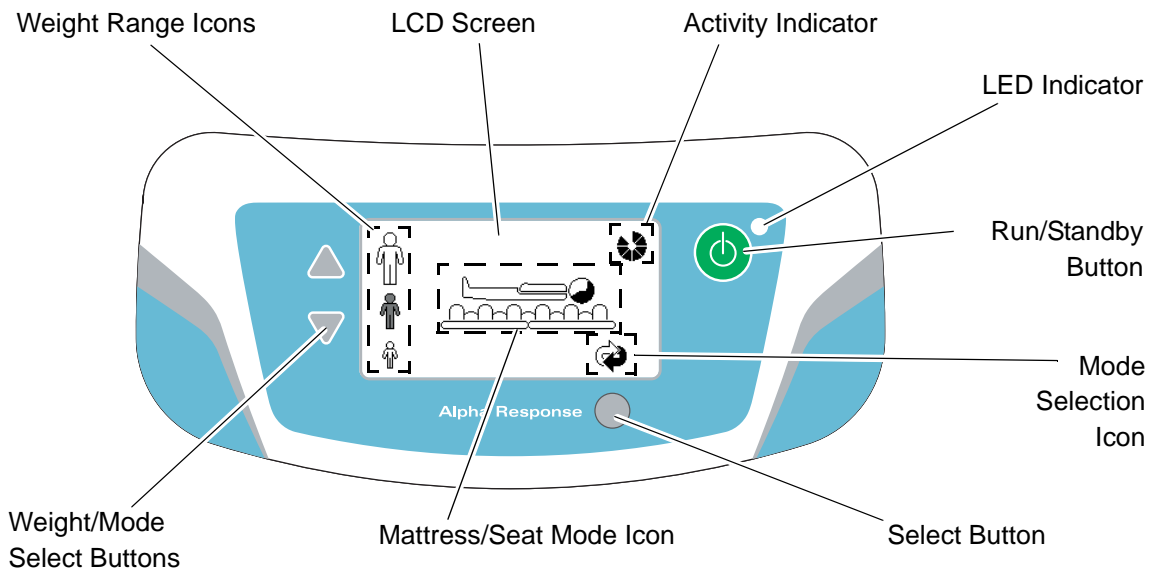


Figure 5 - Electrical Schematic

## 9 Controls, Alarms and Indicators



**Figure 6 - Pump Control Panel**

### LCD Screen

This displays the operating mode and status of the pump, as follows:

- Mattress/Seat Status.
- Weight Range (or Mattress Mode, if selected by the Mode Selection).
- Mode Selection.
- Activity Indicator.

### Run/Standby Button

Press the **Run/Standby** button to put the pump into the **Run** mode; the LED indicator will change to green.

To put the pump into **Standby**, press the **Run/Standby** button for approximately 3 seconds; this prevents accidental operation. The LCD screen will go blank and the LED indicator will change to amber. After you put the pump in **Standby**, if you press the **Run/Standby** button within approximately 15 seconds the pump will go straight to the **Run** mode and continue the previous therapy; if you wait more than 15 seconds the pump will re-initialise and restart the initial mattress/seat cushion inflation sequence.

If the mains power is disconnected from the pump while the pump is operating, the pump will enter the **Power Fail Alarm** mode. Press and hold the **Run/Standby** button; the alarm will stop and the pump will switch off completely.

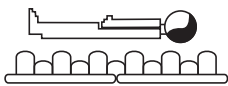
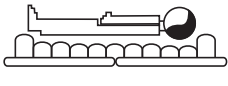
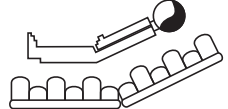
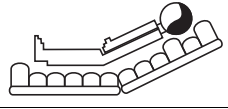
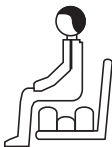
### LED Indicator

The multicolour LED adjacent to the Run/Standby button indicates the status of the pump, as follows:

<b>Amber</b> (Constant)	External power is applied to the pump, but the pump is in <b>Standby</b> .
<b>Green</b> (Constant)	The pump is in <b>Run</b> mode and operating.
<b>Red</b> (Flashing)	The pump has detected an alarm condition.

## Mattress/Seat Status

There are 5 mattress/seat mode icons which can be displayed, as follows:



	Mattress Backrest Horizontal Active (Alternating) Mode
	Mattress Backrest Horizontal Reactive (CLP) Mode
	Mattress Backrest Raised Active (Alternating) Mode
	Mattress Backrest Raised Reactive (CLP) Mode
	Seat Active (Alternating) Mode <sup>(a)</sup>

a. Note: There is no Reactive (CLP) Mode when a seat is connected to the pump.

## Select Button

The function of the Select button depends on whether a mattress or seat is connected to the pump, what change is being carried out to the pump and the Mode Selection Icon currently being displayed on the LCD screen directly above the button.




## Mode Selection Icons

 “Double-Arrow” Icon (Mattress only)	<ul style="list-style-type: none"> <li>This is displayed when a mattress is connected to the pump. It indicates that the pump is in normal therapy mode, and pressing the <b>Select</b> button below it will select the <b>Mode</b> icons (or revert to the <b>Weight Range</b> icons).</li> <li>No icon is displayed above the <b>Select</b> button if a seat cushion is connected to the pump, since the seat only operates in one mode: <b>Active (Alternating) Mode</b>.</li> </ul>
 Flashing “Tick” Icon (Mattress and Seat)	<ul style="list-style-type: none"> <li>When the <b>Weight Range</b> or <b>Mode</b> is being changed, a flashing “tick” will be displayed.</li> <li>Pressing the <b>Select</b> button under the “tick” will confirm the new selection.</li> </ul> <p><b>Note:</b> If the <b>Select</b> button is not pressed for 5 seconds when the “tick” is displayed, the requested pump status change will be ignored, the “tick” will revert to the “Double-arrow” icon (mattress) or go blank (seat) and the pump will continue in its current state.</p>



## Weight Range

There are three **Weight Range** icons displayed on the LCD screen, the relative size of each “person” icon corresponding to the patient weight range. The selected weight range is indicated by the corresponding icon being solid and the other two icons as outlines.

	Light Weight Weight Range: 40-70 kg
	Normal Weight Weight Range: 70-120 kg
	Heavy Weight Weight Range: 120-160 kg

To change the **Weight Range**, do the following:

1. Press the **Weight/Mode Select** buttons to highlight the new **Weight Range** icon; the new icon will be solid and flashing.
2. The **Mode Selection** icon will change to a flashing “tick”.
3. Press the Select button to confirm the new **Weight Range** setting.



### Mode (for Mattress systems only)

**Note:** Mode selection only applies when a mattress replacement or mattress overlay is connected to the pump, since a seat cushion only operates in one mode (**Active (Alternating) Mode**).

The two variants of **Alpha RESPONSE** pump have different **Mode** displays as follows:

















#### UK, Euro and RoW Pump Variants (except the USA)

If the **Select** button is pressed during therapy when the **Mode Selection** icon is displayed, then the **Weight Range** icons are replaced by 2 **Mode** icons. The selected **Mode** is indicated by the corresponding icon being solid and surrounded by a square and the remaining icon as an outline:

	Active (Alternating) Mode Backrest Horizontal
	Reactive (CLP) Mode Backrest Horizontal

#### USA-only Pump Variants

If the Select button is pressed during therapy when the Mode Selection icon is displayed, then the Weight Range icons are replaced by 4 Mode icons. The selected Mode is indicated by the corresponding icon being solid and surrounded by a square and the remaining icon as an outline:

   	<p>Active (Alternating) Mode Backrest Horizontal</p>	   	<p>Reactive (CLP) Mode Backrest Horizontal</p>
   	<p>Active (Alternating) Mode Backrest Raised<sup>(a)</sup></p>	   	<p>Reactive (CLP) Mode Backrest Raised<sup>(a)</sup></p>

- a. If the backrest on the bed is raised (the patient is in a semi-recumbent position), the **Backrest Raised** mode (either **Active** or **Reactive** depending on the therapeutic mode) should be manually selected to increase the pressure in the mattress cells.

To change the **Mode** on mattress systems, do the following:

1. Make sure the “double-arrow” **Mode Selection** icon is displayed.
2. Press the **Select** button, and the **Mode** icons are then displayed:
  - 2 icons for UK, Euro and RoW pump variants (except the USA).
  - 4 icons for USA-only pump variants.
3. Press the **Weight/Mode Select** buttons to highlight the new **Mode** icon. The new **Mode** icon will be solid with a square border.
4. The new **Mode** icon and square will flash and the **Mode Selection** icon will change to a flashing “tick”.
5. Press the **Select** button to confirm the new **Mode**.
6. Press the **Select** button again and the **Mode** icons are replaced by the **Weight Range** icons.

## Activity Indicator

After the mattress has inflated and the system is in the normal operating mode, an **Activity Indicator** icon is displayed in the top right corner of the LCD screen:

- The **Activity Indicator** rotates in a clockwise direction to show that the pump is operating normally.
- The **Activity Indicator** will stop rotating and start flashing if the pressure changes dramatically e.g. if the patient moves heavily on the mattress or if the **Weight Range** is changed. Once the pump pressure has stabilised around its target pressure the **Activity Indicator** will stop flashing and start rotating again.

## Alarms

1. When the pump detects an alarm condition:
  - The corresponding visual alarm is displayed on the LCD screen, as detailed below.
  - The LED indicator on the control panel flashes alternately red and green.
  - An audible alarm is sounded, which increases in pitch if the alarm is ignored.
2. Press the Run/Standby button to stop the alarm.
3. Refer to Chapter 2 “Troubleshooting” for the alarms, their possible causes and their remedies.

## 10 System Setup

### The System

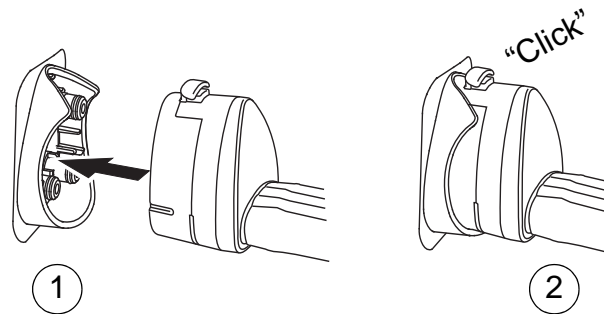
The **Alpha RESPONSE** system comprises:

- **Alpha RESPONSE** pump including mains power cable.
- Either the **Alpha RESPONSE** mattress replacement, **Alpha RESPONSE** mattress overlay or **Alpha RESPONSE** seat cushion, which all have integral tubesets.

### Connecting/Disconnecting the Tubeset

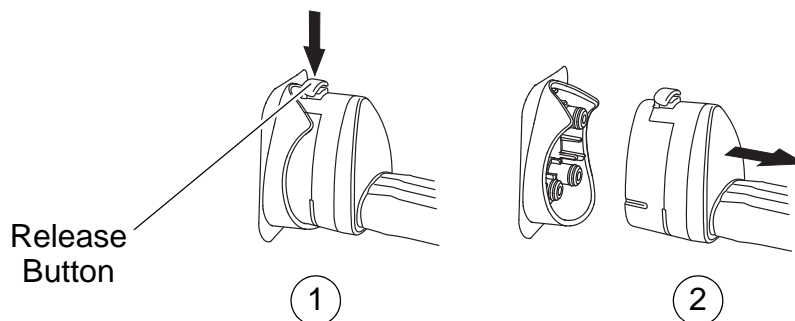
To connect the mattress or seat cushion tubeset onto the pump:

1. Make sure the tubeset is not “kinked” or twisted, and push the tubeset connector firmly onto the pump until it clicks into place.
2. Make sure that the tubeset is securely connected to the pump.



To disconnect the tubeset:

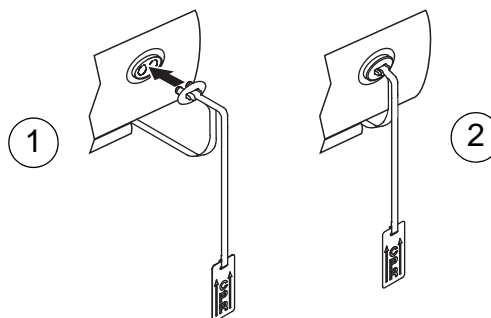
1. Push down the release button on the top of the tubeset connector and pull the tubeset connector away from the pump.
2. This will put the mattress into Transport Mode and will not deflate the mattress. To deflate the mattress, refer to “To Deflate the Mattress” on page 18.



### To Close, or Reset, the CPR Control on the Mattress

If a mattress is connected to the pump, to close the CPR control:

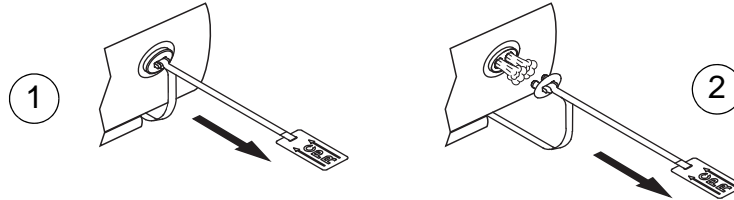
1. Push the CPR plug into the connector on the mattress.
2. Make sure the plug is securely fitted.



**To Activate, or Open, the CPR Control on the Mattress**

1. Use a quick, firm pull on the CPR tag to remove the CPR plug. The air will be rapidly evacuated from the mattress.
2. The plug is fastened to the mattress by a strap.

**Note:** If the pump is operating when the CPR is activated, the Low Pressure alarm may be activated.

**To Deflate the Mattress**

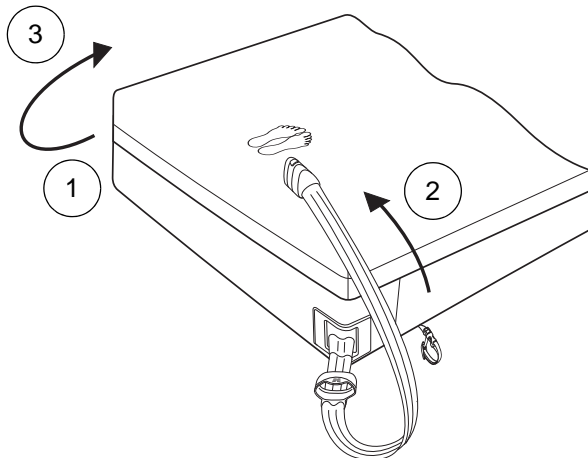
1. Stop the therapy and put the pump into **Standby**.
2. Disconnect the tubeset from the pump (refer to "Connecting/Disconnecting the Tubeset" on page 11).
3. Activate the CPR control at the head end of the mattress to deflate it (refer to "To Activate, or Open, the CPR Control on the Mattress" on page 12).

**To Store the Mattress**

Following deflation:

1. Start rolling the mattress from the foot end towards the head end; stop after ONE turn of the mattress.
2. Bring the tubeset connector over the mattress and secure.
3. Continue to roll the mattress from the foot end towards the head end.

**Note:** Make sure the mattress is dry before rolling it up.

**Transport Mode**

To transport a patient who is lying on the **Alpha RESPONSE** mattress:

1. Stop the therapy and put the pump into **Standby**.
2. Disconnect the tubeset from the pump (refer to "Connecting/Disconnecting the Tubeset" on page 11). This will automatically put the mattress into transport mode.
3. To resume normal operation, reconnect the tubeset to the pump and restart the therapy.

## CHAPTER 2

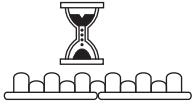

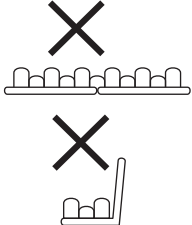



### TROUBLESHOOTING

#### 1 General



- 1.1 When the pump detects an alarm condition:
- 1.1.1 The corresponding visual alarm is displayed on the LCD screen (refer to Table 1).
  - 1.1.2 The LED indicator on the control panel flashes alternately red and green.
  - 1.1.3 An audible alarm is sounded, which increases in pitch if the alarm is ignored.
- 1.2 After diagnosing the fault, press the **Run/Standby** button to reset the alarm.

#### 2 Troubleshooting Table

Table 1 - Troubleshooting

LCD Screen	Fault	Possible Cause	Remedy
	Mattress Inflating	Pump is inflating the mattress replacement or mattress overlay.	The “egg timer” is replaced by the patient body icon when mattress inflation is complete.
	Seat Inflating	Pump is inflating the seat cushion.	The “egg timer” is replaced by the patient body icon when seat cushion inflation is complete.
	No Mattress or Seat (mattress and seat graphics alternate)	<ol style="list-style-type: none"> <li>1. No tubeset connected to pump.</li> <li>2. Tubeset fitted but not connected securely.</li> </ol>	<ol style="list-style-type: none"> <li>1. Connect a mattress or seat tubeset to the pump.</li> <li>2. Remove and reconnect tubeset; push tubeset onto pump until a “click” is heard.</li> </ol>
	Low Pressure	<ol style="list-style-type: none"> <li>1. Tubeset is not connected properly.</li> <li>2. CPR control not fully closed.</li> <li>3. There is a leak in the system.</li> </ol>	<ol style="list-style-type: none"> <li>1. Reconnect tubeset; push tubeset onto pump until a “click” is heard.</li> <li>2. Make sure CPR plug is fully pushed into CPR grommet.</li> <li>3. Inspect the inside of the pump and mattress/seat cushion for any tubes which are leaking due to damage or not fitted correctly. Refit or replace the affected part.</li> </ol>
	High Pressure	<ol style="list-style-type: none"> <li>1. Tubeset is “kinked” or blocked.</li> <li>2. Pump has detected an internal fault.</li> </ol>	<ol style="list-style-type: none"> <li>1. Inspect and remove any “kinks” or blockages in the tubeset.</li> <li>2. Inspect the inside of the pump and mattress/seat cushion for any tubes which are occluded due to damage or not fitted correctly. Refit or replace the affected part.</li> </ol>
	Power Fail	External mains power supply has been removed while the pump is operating.	Reconnect the mains power supply to the pump.

**Table 1 - Troubleshooting**

LCD Screen	Fault	Possible Cause	Remedy
	Hardware Fail	Pump has detected an internal fault.	Refer to “Hardware Error Messages and Error Codes” on page 14 for more information on the hardware fault.
	Service Indicator (in top right of LCD screen)	Pump needs a service: 1. After 12 months run time, the spanner icon is illuminated. 2. After a further 3 months run time, the spanner icon starts flashing.	Carry out the maintenance procedure detailed in Chapter 3 “Maintenance”, Page 20, “Pump Service”.

### 3 Hardware Error Messages and Error Codes

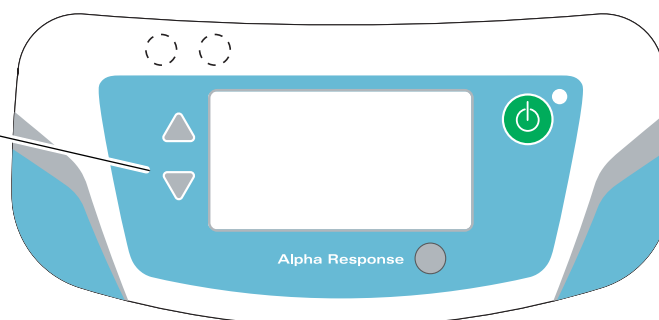
When the pump detects an internal fault, it displays it as an error message on the LCD screen or as an error code on the TAPP Communicator, as follows:

#### 3.1 Hardware Error Message on the LCD Screen:



- When the **Hardware Fail** alarm is displayed on the LCD screen, press the **Weight/ Mode Select Up** button (refer to Figure 7) and a hardware error message will be displayed on the LCD screen.
- Refer to Page 15, Table 2 for the hardware error messages and their remedy.

Weight/Mode Select  
Up Button



**Figure 7 - Displaying Hardware Fault Messages**

#### 3.2 TAPP Communicator Error Code:

- 3.2.1 Make sure the pump is powered up and in **Standby** (blank screen, amber LED):
- 3.2.2 Set up the TAPP Communicator (refer to Chapter 4, Page 25, Section 4).
- 3.2.3 Go down the list of commands on the TAPP Communicator to the group headed **ENGINEERING** and send the command: **78C: Read Errors**.
- 3.2.4 Inspect the **Response** box on the TAPP Communicator:
  - 3.2.4.1 If there are no faults, it will display **SUCCESS (0x0000)**.
  - 3.2.4.2 If there are faults, it will display an error code (e.g. **0x0020**) which indicates that the pump is faulty. To diagnose the fault(s), do the following:
    - If the error code on the LCD screen agrees exactly with any one of the error codes in Page 15, Table 2, then the pump has a single fault: E.g. **0x0020** indicates **Microswitch HW** fault.
    - If the error code on the LCD screen does **NOT** agree with any of the error codes in Page 15, Table 2, then the pump has multiple faults. Refer to Page 17, Section 4 for diagnosing multiple faults.

Table 2 - Hardware Error Messages and Error Codes for Single Faults

Hardware Error Message on LCD Screen	Communicator Error Code for Single Fault <sup>(a)</sup>	Explanation of Fault	Remedy
EEPROM READ	0x0001	Read failure on EEPROM on display PCB assembly	Replace the display PCB assembly: <ul style="list-style-type: none"> <li>Chapter 5 "Pump Repair", Page 61, Section 18</li> <li>Chapter 5 "Pump Repair", Page 62, Section 19</li> </ul>
EEPROM WRITE	0x0002	Write failure on EEPROM on display PCB assembly	Replace the display PCB assembly: <ul style="list-style-type: none"> <li>Chapter 5 "Pump Repair", Page 61, Section 18</li> <li>Chapter 5 "Pump Repair", Page 62, Section 19</li> </ul>
ADC Chip	0x0004	Failure of ADC chip on display PCB assembly	Replace the display PCB assembly: <ul style="list-style-type: none"> <li>Chapter 5 "Pump Repair", Page 61, Section 18</li> <li>Chapter 5 "Pump Repair", Page 62, Section 19</li> </ul>
Bleed HW	0x0008	Failure of bleed solenoid on power supply PCB assembly	Replace the power supply PCB assembly: <ul style="list-style-type: none"> <li>Chapter 5 "Pump Repair", Page 67, Section 22</li> <li>Chapter 5 "Pump Repair", Page 67, Section 23</li> </ul>
Sync motor HW	0x0010	Failure of synchronous motor on motor & pressure module assembly	Replace the motor & pressure module assembly: <ul style="list-style-type: none"> <li>Chapter 5 "Pump Repair", Page 59, Section 16</li> <li>Chapter 5 "Pump Repair", Page 59, Section 17</li> </ul>
Microswitch HW	0x0020	Failure of microswitch on motor & pressure module assembly	Replace the motor & pressure module assembly: <ul style="list-style-type: none"> <li>Chapter 5 "Pump Repair", Page 59, Section 16</li> <li>Chapter 5 "Pump Repair", Page 59, Section 17</li> </ul>
Calibration required	0x0040	Pressure calibration required on display PCB assembly	Replace the display PCB assembly: <ul style="list-style-type: none"> <li>Chapter 5 "Pump Repair", Page 61, Section 18</li> <li>Chapter 5 "Pump Repair", Page 62, Section 19</li> </ul>
Set up required	0x0080	Failure of EEPROM settings on display PCB assembly	Replace the display PCB assembly: <ul style="list-style-type: none"> <li>Chapter 5 "Pump Repair", Page 61, Section 18</li> <li>Chapter 5 "Pump Repair", Page 62, Section 19</li> </ul>

**Table 2 - Hardware Error Messages and Error Codes for Single Faults**

Hardware Error Message on LCD Screen	Communicator Error Code for Single Fault <sup>(a)</sup>	Explanation of Fault	Remedy
Power Detect Faulty OR Unreliable Power	0x0100	Failure of mains detect circuit on power supply PCB assembly and/or display PCB assembly	<p>Replace the power supply PCB assembly:</p> <ul style="list-style-type: none"> <li>Chapter 5 “Pump Repair”, Page 67, Section 22</li> <li>Chapter 5 “Pump Repair”, Page 67, Section 23</li> </ul> <p>If fault not cleared, replace the display PCB assembly:</p> <ul style="list-style-type: none"> <li>Chapter 5 “Pump Repair”, Page 61, Section 18</li> <li>Chapter 5 “Pump Repair”, Page 62, Section 19</li> </ul> <p>If replacing the two PCB assemblies still does not cure the fault, there could be a problem with the mains power supply at the customer’s site.</p>
Faulty Battery?  (refer also to Section 5, Page 18 “Faulty Battery?”)	0x0200	Rechargeable battery on display PCB assembly is faulty or not connected	<p>Replace the rechargeable battery on the display PCB assembly:</p> <ul style="list-style-type: none"> <li>Chapter 5 “Pump Repair”, Page 64, Section 20</li> </ul> <p>If fault not cleared, replace the display PCB assembly:</p> <ul style="list-style-type: none"> <li>Chapter 5 “Pump Repair”, Page 61, Section 18</li> <li>Chapter 5 “Pump Repair”, Page 62, Section 19</li> </ul>
Microswitch on in Xover	0x0400	Crossover error on microswitch on motor & pressure module assembly	<p>Replace the motor &amp; pressure module assembly:</p> <ul style="list-style-type: none"> <li>Chapter 5 “Pump Repair”, Page 59, Section 16</li> <li>Chapter 5 “Pump Repair”, Page 59, Section 17</li> </ul>

- a. E.g. **0x0020** indicates **Microswitch HW** fault.  
The “**0x**” indicates that the next 4 digits are hexadecimal (i.e. 0 - F).  
For error codes for multiple faults, refer to Section 4, Page 17 “Communicator Error Codes for Multiple Faults”.



## 4 Communicator Error Codes for Multiple Faults

- 4.1 Using the TAPP Communicator, send the command **78C: Read Errors**.
- 4.2 The **Response** box on the TAPP Communicator will display errors in the format: **0x0000**:
- 4.2.1 "**0x**" indicates that the next 4 digits are hexadecimal i.e. each digit can be any number/letter in the range 0 - F, refer to Table 3.
- 4.2.2 "**0000**" are the 4 hexadecimal error code digits.
- 4.3 A single error bit is set for each separate fault that is detected:
- 4.3.1 If a single fault is detected, then the single error bit is converted to a hexadecimal digit, as detailed in Page 15, Table 2.
- 4.3.2 If multiple faults are detected, then EACH GROUP of 4 binary digits is combined into a single hexadecimal digit (refer to Figure 8 and Table 3). For example:
- "Faulty Battery" and "Bleed Solenoid" faults would be displayed as: **0x0208**.
  - "EEPROM Write" and "EEPROM Read" faults would be displayed as: **0x0003**.
  - "Setup" and "Calibration" faults would be displayed as: **0x00C0**.
- 4.4 To determine the actual faults from the error code on the Communicator, do the following. For example, if the error code is **0x0030**:
- Using Table 3, convert each hexadecimal digit of the error code to binary:  
So **0030** becomes **0000 0000 0011 0000**.
  - From Figure 8 this equates to **Microswitch** and **Sync Motor** faults.
  - Similarly, **000A** becomes **0000 0000 0000 1010**  
which equates to **Bleed Solenoid** and **EEPROM Write**.

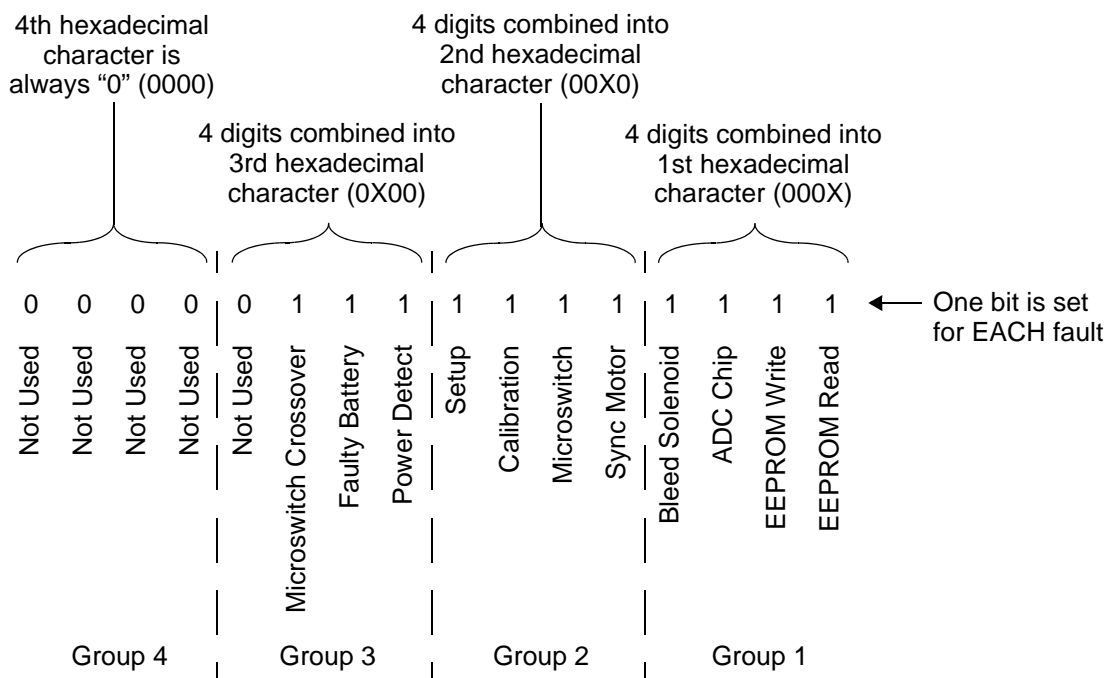


Figure 8 - Communicator Error Code Format for Multiple Faults

Table 3 - Hexadecimal to Binary Conversion

Hex	Binary	Hex	Binary	Hex	Binary	Hex	Binary
0	0000	4	0100	8	1000	C	1100
1	0001	5	0101	9	1001	D	1101
2	0010	6	0110	A	1010	E	1110
3	0011	7	0111	B	1011	F	1111

## 5 Faulty Battery?

If the Fault Message on the LCD Screen is **Faulty Battery?**, then you can interrogate the pump with the TAPP Communicator, as follows:

- 5.1 Make sure the pump is powered up and in **Standby** (blank screen, amber LED).
- 5.2 Set up the TAPP Communicator (refer to Chapter 4 "Testing", Page 25, "Setting up the TAPP Communicator").
- 5.3 Go down the list of commands on the TAPP Communicator to the group headed **BATTERY** and send the following command:
  - 5.3.1 **102: Battery Level.**
  - 5.3.2 The Communicator response window **Rx Data** will show if the battery level is "within" or "outside of" the acceptable range.
  - 5.3.3 A typical response if the battery level is within the acceptable range is:  
"Battery Level (726) is within acceptable range (537 to 806)."
  - 5.3.4 If it is outside of the acceptable range, either the battery is faulty, its connector has become disconnected from the display PCB assembly or the display PCB assembly is faulty.
- 5.4 End of procedure.

## CHAPTER 3

### MAINTENANCE

**WARNING:** *BEFORE DISMANTLING THE PUMP, MAKE SURE IT HAS BEEN ISOLATED FROM THE MAINS/POWER SUPPLY BY REMOVING THE MAINS/POWER PLUG FROM THE WALL SOCKET.*

**WARNING:** *A POTENTIAL ELECTRICAL SHOCK HAZARD EXISTS ON THE POWER SUPPLY PCB ASSEMBLY WHEN THE PUMP IS OPENED, EVEN WITH THE PUMP SWITCHED OFF.*

**WARNING:** *BEFORE POWERING UP AND TESTING THE PUMP, MAKE SURE THE PUMP HAS BEEN COMPLETELY REASSEMBLED AND THE REAR CASE ASSEMBLY IS SECURED TO THE FRONT CASE ASSEMBLY.*

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


#### 1 Maintenance Procedures

- 1.1 For a pump, carry out the following procedures:
  - 1.1.1 To see if a service is due, refer to Page 19, Section 3.
  - 1.1.2 To service the pump, refer to Page 20, Section 4.
- 1.2 For a mattress replacement or mattress overlay, refer to Page 21, Section 6.
- 1.3 For a seat cushion, refer to Page 21, Section 8.

#### 2 Serial Labels

- 2.1 Pump: the pump serial label is an adhesive label stuck on the outside of the pump rear case.
- 2.2 Mattress Replacement and Mattress Overlay: the mattress serial label is a fabric label stitched to the inside of the base cover at the foot end, on the opposite side to the tubeset.
- 2.3 Seat Cushion: the seat cushion serial label is a fabric label stitched to the inside of the base cover, at the front.

#### 3 Examining the Pump to See if a Service is Due

- 3.1 The **Service Indicator**  is illuminated in the top right of the pump LCD screen to indicate that a pump service is due, as follows:
  - 3.1.1 After 12 months run time (8,760 hours) has elapsed from initial manufacture or the last service, the spanner icon is illuminated to indicate that a service is now due.
  - 3.1.2 After a further 3 months run time, the spanner icon starts flashing to indicate the increasing urgency of a service.
- 3.2 If the **Service Indicator** is not illuminated, then the **Run Hours** on the pump can be interrogated using the TAPP Communicator to see when the pump was last serviced, as follows:
  - 3.2.1 Make sure the pump is powered up and in **Standby** (blank screen, amber LED).
  - 3.2.2 Set up the TAPP Communicator (refer to Chapter 4 "Testing", Page 25, "Setting up the TAPP Communicator").
  - 3.2.3 Go down the list of commands on the TAPP Communicator to the group headed **SERVICE** and send the following command:
    - 3.2.3.1 **206: Read Service Interval.**
    - 3.2.3.2 The Communicator response window **Rx Data** will display the number of hours since the pump was manufactured or last serviced, and should be in the range **0** to **8760**.

**Note:** *When a pump is manufactured or serviced, the **Service Interval** is reset to **0** and increments up to **8760** (12 months), at which time the **Service Indicator** is illuminated.*

## 4 Pump Service

- 4.1 Carry out the pump maintenance checks, detailed below (refer to Page 20, Section 5).
- 4.2 Replace the following components:
- Note:** Refer to Table 4 for a list of the components which you must have available before you start servicing the pump.
- 4.2.1 The four AV mounts on the compressor assembly (refer to Chapter 5 “Pump Repair”, Page 51, Section 8 and Chapter 5 “Pump Repair”, Page 51, Section 9).
- 4.2.2 Air inlet filter and filter clip on the compressor assembly (refer to Chapter 5 “Pump Repair”, Page 53, Section 11).
- 4.2.3 Inlet filter felt on the rear case (refer to Chapter 5 “Pump Repair”, Page 46, Section 3).
- 4.2.4 Bio-filter inside the pump (refer to Chapter 5 “Pump Repair”, Page 69, Section 24).
- 4.3 Carry out the following tests:
- 4.3.1 Initial pump tests (refer to Chapter 4 “Testing”, Page 30, Section 6).
- 4.3.2 Pump flow and pressure tests (refer to Chapter 4 “Testing”, Page 32, Section 7).
- 4.3.3 Electrical safety tests (refer to Chapter 4 “Testing”, Page 42, Section 10).

**Table 4 - Routine Maintenance Parts List**

Item	Part Number	Description	Qty
	500416	AV Mount	4
	500417	Filter Felt, Compressor Inlet	1
	500410	Filter Clip	1
	507374	Filter Felt, Pump Inlet	1
	630454	Bio-Filter	1

## 5 Pump Maintenance Checks

- 5.1 Visually inspect the following for damage, wear and potential faults. If any parts are found to be damaged they must be replaced in accordance with Chapter 5 “Pump Repair”:
- Front and rear cases: Inspect for damage and security.
  - Bed hooks: Inspect for damage and security.
  - O-rings and outlet ports on the manifold assembly: Inspect for damage.
  - Display membrane label: Inspect for damage and security to case.
  - Mains/power lead: Inspect for damage and security of plug.
  - Rubber feet (8 off): Inspect for security.
  - Labels: Make sure all labels are present and legible.
- 5.2 Remove the rear case (refer to Chapter 5 “Pump Repair”, Page 48, Section 5) and visually inspect the following for damage, wear, security and potential faults. If any parts are found to be damaged they must be replaced in accordance with Chapter 5 “Pump Repair”:
- Compressor assembly, including AV pillars.  
*Note: The compressor assembly is a replaceable sub-assembly and cannot be repaired.*
  - Display PCB assembly, including rechargeable battery.
  - Power supply PCB assembly.

- Outlet manifold assembly, including rear PCB assembly.
- Motor & pressure module assembly.  
*Note: The motor & pressure module assembly is a replaceable sub-assembly and cannot be repaired.*
- Wiring.
- Internal Tubing.
- Screws, nuts and bolts.

## 6 Mattress Replacement and Mattress Overlay Service

- 6.1 Carry out the mattress replacement and mattress overlay maintenance checks (refer to Page 21, Section 7).
- 6.2 Carry out an inflation test of the mattress replacement or mattress overlay (refer to Chapter 4 “Testing”, Page 43, Section 11).

## 7 Mattress Replacement and Mattress Overlay Maintenance Checks

Visually inspect the following for damage, wear and potential faults. If any parts are found to be damaged they must be replaced in accordance with Chapter 6 “Mattress Replacement & Overlay Repair”:

- |  |  |
|--|--|
| • Top cover:   | Inspect for tears, staining, clarity of printed labels.  |
| • Top cover zips:  | Make sure zips run freely, and inspect the condition of zip teeth.   |
| • Cell assemblies:                                       | Inspect for damage and security.   |
| • B-pad assembly:  | Inspect for damage and security.   |
| • Manifold and tubing, including non-return valves:      | Inspect for damage and security.   |
| • CPR box assembly:                                      | Confirm correct operation of the fast deflate mechanism.   |
| • Pump tubeset assembly:                                 | Inspect for damage and security of connection.   |
| • Pneumatic connections on CPR box assembly:             | Inspect for damage and security of connections.  |
| • Profile valve main assembly (all variants except USA): | Inspect for security of and damage to the profile valve main assembly, protection pad and the profile valve tube assembly. |
| • Fixing straps:   | Inspect condition and security.  |
| • Loop sheet assembly:                                   | Inspect for damage and security.   |
| • Base cover assembly:                                   | Inspect for broken/torn securing straps.   |
| • Connectors:  | Inspect for damage and security.   |
| • Press studs:   | Inspect for damage and security.   |

## 8 Seat Cushion Service

- 8.1 Carry out the seat cushion maintenance checks, detailed below (refer to Page 22, Section 9).
- 8.2 Carry out an inflation test of the seat cushion (refer to Chapter 4 “Testing”, Page 43, Section 11).

## 9 Seat Cushion Maintenance Checks

Visually inspect the following for damage, wear and potential faults. If any parts are found to be damaged they must be replaced in accordance with Chapter 7 "Seat Cushion Repair":

- Top cover: Inspect for tears, staining, clarity of printed labels.
- Top cover zip: Make sure zip runs freely, and inspect the condition of zip teeth.
- Welded cell assembly: Inspect for damage and security.
- Base assembly, including manifolds: Inspect for damage and security.
- Dump valves on base assembly: Confirm correct operation of the fast deflate mechanism.
- Pump tubeset assembly: Inspect for damage and security of connection.
- Fixing straps: Inspect condition and security.
- Connectors: Inspect for damage and security.

## CHAPTER 4

### TESTING

**WARNING: BEFORE PERFORMING ANY TESTING PROCEDURES, MAKE SURE THAT THE SYSTEM (PUMP AND MATTRESS OR SEAT CUSHION) HAS BEEN ADEQUATELY DECONTAMINATED.**

**WARNING: BEFORE POWERING UP AND TESTING THE PUMP, MAKE SURE THE PUMP HAS BEEN COMPLETELY REASSEMBLED AND THE REAR CASE ASSEMBLY IS SECURED TO THE FRONT CASE ASSEMBLY.**

#### 1 Test Requirements

- 1.1 To test the pump after any repair or service, carry out the tests on Page 23, "Pump Tests".
- 1.2 To test the mattress replacement, mattress overlay or seat cushion after any repair or service, carry out the tests on Page 43, "Inflation Test of the Mattress Replacement, Overlay or Seat Cushion".

#### 2 Pump Tests

- 2.1 Carry out the following tests on the pump after any repair or service:
  - 2.1.1 Tubeset and Power Fail Tests (refer to Page 30, Section 6).
  - 2.1.2 Pump Flow and Pressure Tests (refer to Page 32, Section 7).
- 2.2 If any of the following pump sub-assemblies are replaced, carry out the procedure on Page 39, "Setting Serial Numbers for New Sub-Assemblies" to enter the new serial numbers into the pump software:
  - Power supply PCB assembly.
  - Compressor & bracket assembly.
- 2.3 To adjust the contrast setting for the LCD screen or to change the bed profile status, carry out the procedures in Engineering Settings (refer to Page 40, Section 9).
- 2.4 Carry out the Electrical Safety Tests (refer to Page 42, Section 10).

### 3 Test Equipment

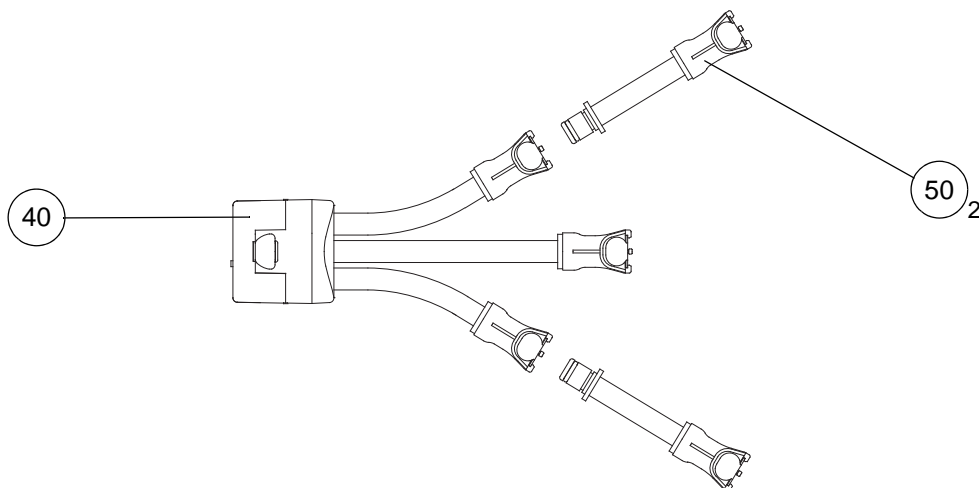
3.1 To test the pump correctly, the test equipment in Table 5 is required.

**Note:** All test equipment must be calibrated to national or international standards.

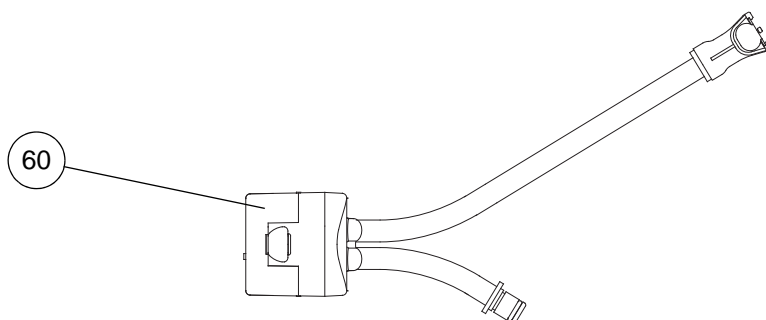
3.2 A tubeset connector must always be connected to the pump when it is in the **Run** mode; the pump will fail if it can not detect a mattress or seat cushion connector fitted to it.

**Table 5 - Pump Flow/Pressure and Function Test Equipment**

Item	Test Equipment	Part Number	Qty
10	Laptop / Desktop PC running Microsoft® Windows®	-	1
20	TAPP Communicator Software	SERS008	1
30	USB Adaptor Cable (A to mini-B)	MIS500	1
40	Mattress Service Tubeset Assembly (Figure 9)	465496	1
50	Flow Check Adaptor (Figure 9)	465497	2
60	Seat Service Adaptor (Figure 10)	465498	1
70	Flow / Pressure Rig, 3-26 ltr/min	PRE073	1



**Figure 9 - Mattress Test Equipment**

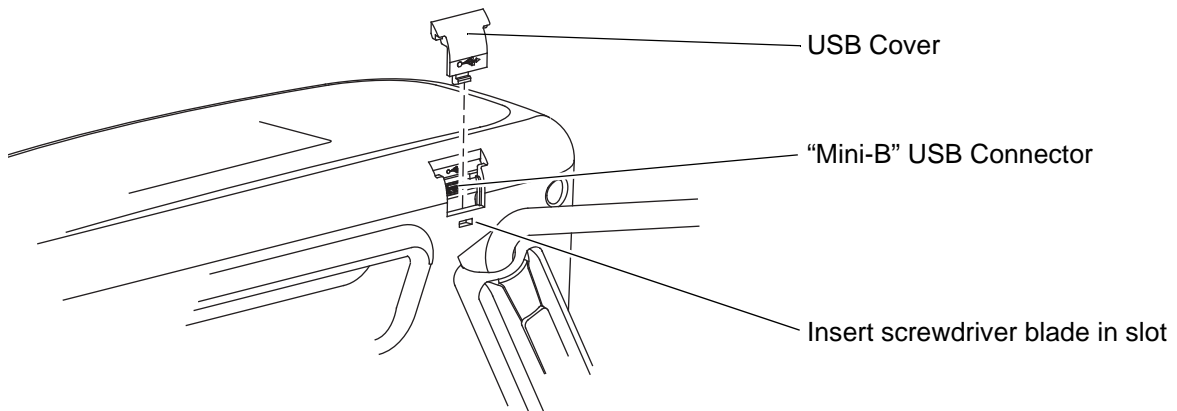


**Figure 10 - Seat Cushion Test Equipment**



## 4 Setting up the TAPP Communicator

- 4.1 Using a small flat-bladed screwdriver, carefully remove the USB cover from the top rear of the pump (Figure 11).

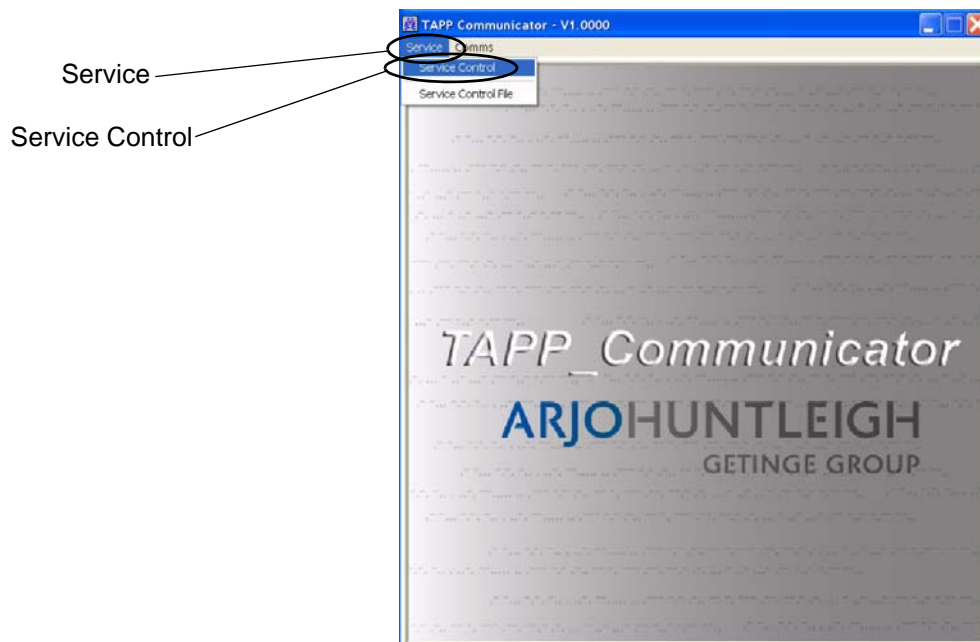


**Figure 11 - Removal of USB Cover**

- 4.2 Make sure the TAPP Communicator software (Table 5, Item 20) is installed on the PC.
- 4.3 Connect the USB Adaptor Cable (Table 5, Item 30) between the PC and the pump:
- 4.3.1 Connect the small USB connector (mini-B) to the USB connector on the pump (Figure 11).
- 4.3.2 Connect the large USB connector (A) to any USB port on the PC.

### Running the TAPP Communicator Software

- 4.4 Run the TAPP Communicator software on the PC.
- 4.5 On the **Welcome Screen**, select **Service** followed by **Service Control** (Figure 12), and a file list will be displayed (Figure 13).



**Figure 12 - TAPP Communicator: Welcome Screen**

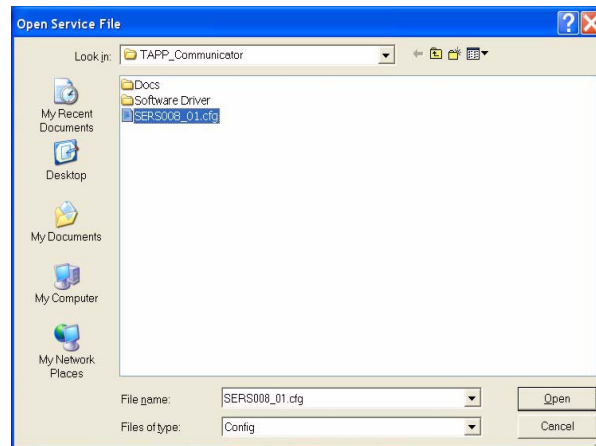


Figure 13 - TAPP Communicator: Command File Selection

- 4.6 Highlight the file **SERS008\_XX.cfg** file (where **XX** is the version) and click **Open**.  
 4.7 The **Service Screen** will be displayed (Figure 14).

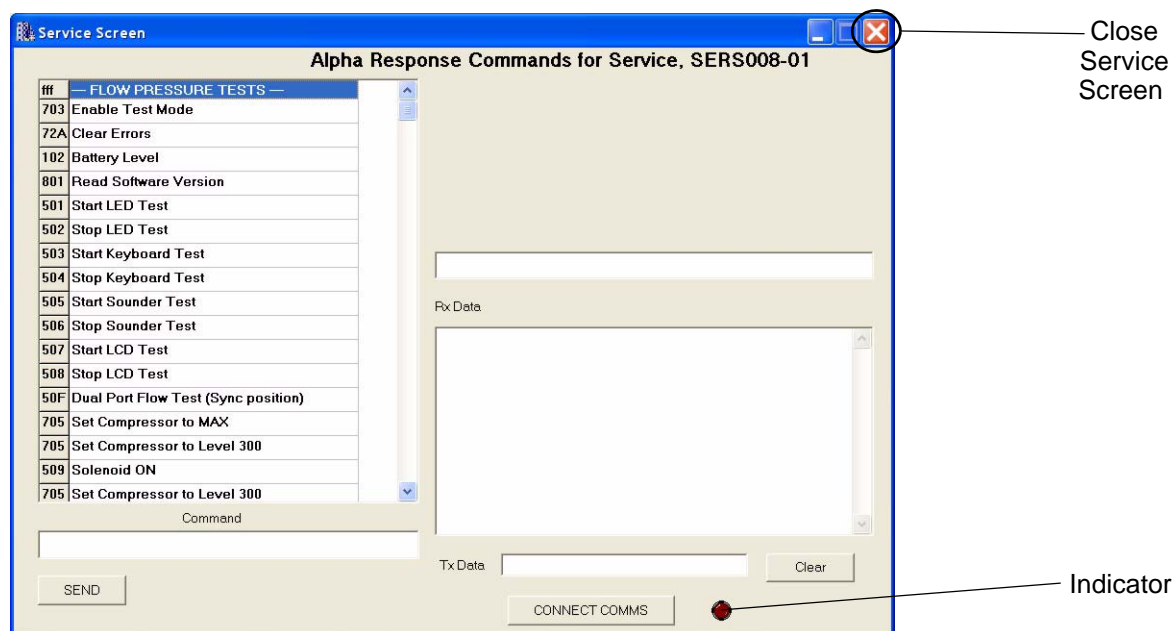


Figure 14 - TAPP Communicator: Service Screen

**Note:** The PC cannot communicate with the pump as the Comms Port has not yet been activated.

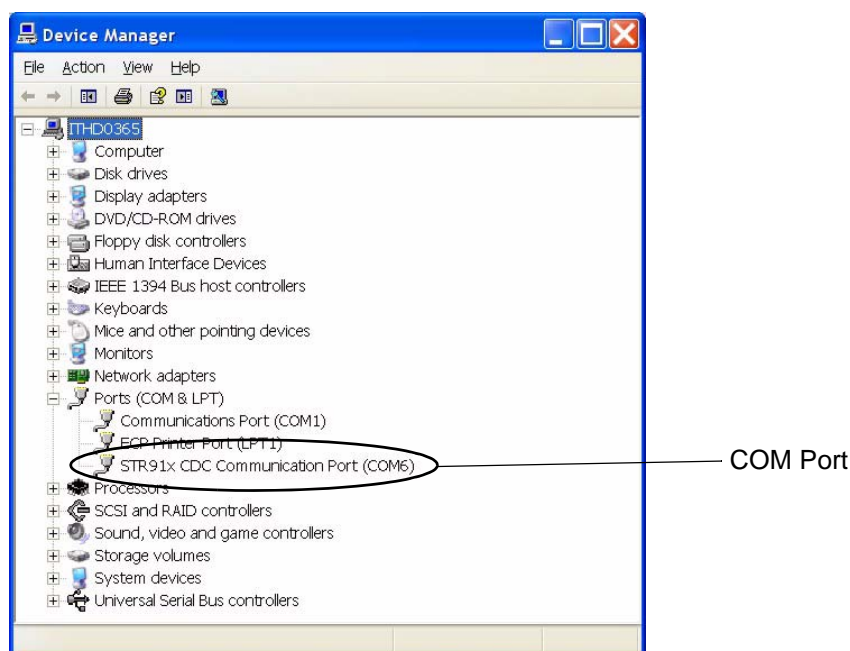
- 4.8 To activate the comms port, click **CONNECT COMMS** at the bottom of the screen. The indicator to the right of **CONNECT COMMS** will change from red to green and the text on the button will change to **DISCONNECT COMMS**.

**Note:** The TAPP Communicator can now interrogate the pump and send commands to it.

- 4.9 If the text on the button does not change to **DISCONNECT COMMS** and the indicator does not change to green, then there is NO communication between the pump and the PC. Do the following:

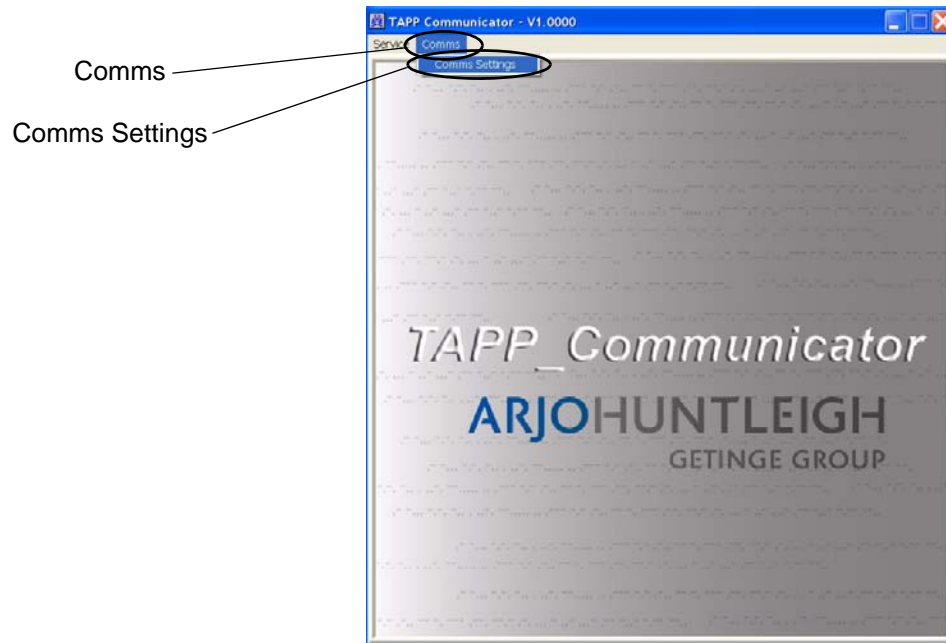
- 4.9.1 If Windows asks for a “driver for the new USB hardware it has detected”, install the **USB Virtual COM Port Driver**.

- 4.9.2 If Windows does not ask for a driver, then it has already been installed correctly, and the problem is that the wrong USB Port is set up in the TAPP Communicator software. Change the USB Port as follows:
- 4.9.2.1 On the PC, click:
- **Start.**
  - **Control Panel.**
  - **System.**
  - **Hardware** tab.
  - **Device Manager.**
- 4.9.2.2 On the **Device Manager** screen, expand the **Ports (COM & LPT)** section, and there will be the following entry (refer to Figure 15):  
**STR91x CDC Communication Port (COMx)**
- In the example below, the **COM** port number is **COM6**.
  - Record the **COM** port number, which will be used in Para 4.9.2.7, below.
- Note:** This port only exists when an **Alpha RESPONSE** pump is connected to the PC.

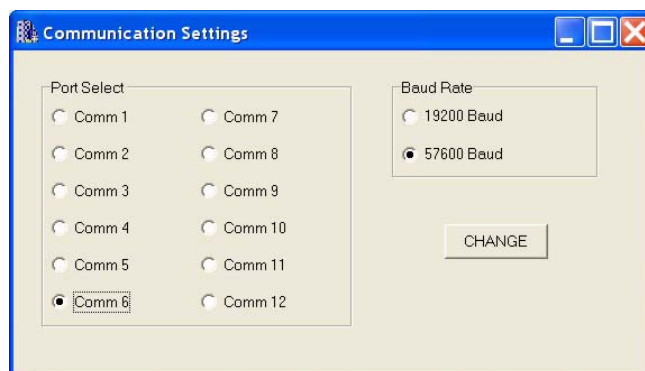


**Figure 15 - TAPP Communicator: Identification of COM Port (Example Only)**

- 4.9.2.3 Click on the "X" in the top corner of the following screens to close them:
- **Device Manager.**
  - **System.**
  - **Control Panel.**
- 4.9.2.4 Click on the "X" in the top corner of the **Service Screen** to close it (refer to Figure 14).
- 4.9.2.5 On the **Welcome Screen**, select **Service** followed by **Service Control** (Figure 16).
- 4.9.2.6 The **Communication Settings** screen will be displayed (Figure 17).
- 4.9.2.7 Select the same **Comm** port number that was identified in Para 4.9.2.2, above. Make sure that **57600 Baud** is selected.
- 4.9.2.8 You **MUST** click on the **CHANGE** button to confirm the selections.
- 4.9.2.9 Click on the "X" in the top corner of the **Communication Settings** screen to close it (refer to Figure 17).
- 4.9.2.10 The pump should now be able to communicate with the PC.



**Figure 16 - TAPP Communicator: Selecting Comms Settings**



**Figure 17 - TAPP Communicator: Communication Settings**

4.10 Repeat the start up of the TAPP Communicator software (refer to Page 25, "Running the TAPP Communicator Software").

**Note:** The TAPP Communicator can now interrogate the pump and send commands to it.

## 5 Description of TAPP Communicator Service Screen

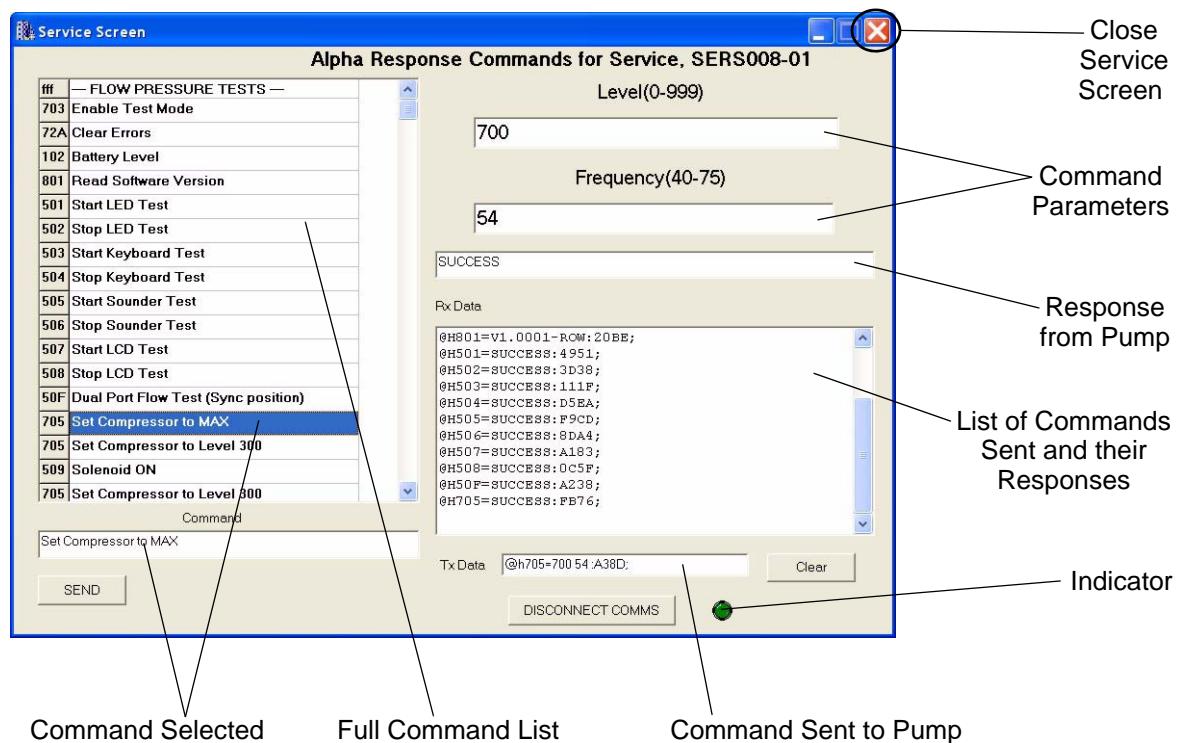


Figure 18 - TAPP Communicator: Typical Service Screen

Table 6 - Service Screen Description

Screen Legend	Description
Command Selected	This is the same command highlighted in the command list above it, but not necessarily sent to the pump. If applicable, you can change the parameters for a particular command before you send it to the pump. <b>Note:</b> Do not change parameters unless the procedure tells you to. To send this command to the pump, do either of the following: <ul style="list-style-type: none"> <li>Click the <b>SEND</b> button.</li> <li>Double-click the selected command in the command list.</li> </ul>
Command Parameters	If applicable, these are the parameters for a particular command. They have default values set by the TAPP Communicator software. The parameters can be over-written before you send the command to the pump, but extreme caution must be used with commands which could damage the pump.
Command Sent to Pump	<b>TX Data:</b> This is the last command actually sent to the pump, together with the details of any parameters set (if applicable).
Response from Pump	<b>Rx Data:</b> This is the response from the pump. It will usually say <b>SUCCESS</b> (to indicate the command was received successfully by the pump), together with other parameters.
List of Commands Sent and their Responses	<b>Rx Data:</b> This lists all the commands (and parameters) sent to the pump and all responses (and parameters) received from it.
Clear Button	This will clear two text boxes (refer to Figure 18): <ul style="list-style-type: none"> <li>Response from Pump.</li> <li>List of Commands Sent and their Responses.</li> </ul>

## 6 Tubeset and Power Fail Tests

- 6.1 Do NOT connect any tubeset to the side of the pump until instructed to do so.
- 6.2 At all times during the test procedure the pump LCD screen should be as clear as possible. If it is not clear, carry out the procedure detailed in “Engineering Settings” on page 40 to adjust the contrast of the LCD screen.
- 6.3 Insert the mains power plug into a suitable mains power socket.
  - 6.3.1 The LED indicator should illuminate amber to indicate that external power is applied to the pump but the pump is still in **Standby**.
  - 6.3.2 The LCD screen should be blank.
- 6.4 Press the Run/Standby button to put the pump into the **Run** mode:
  - 6.4.1 The LED indicator should change to green.
  - 6.4.2 The LCD screen should display the ArjoHuntleigh logo followed by the **Alpha RESPONSE** animated logo (Figure 19), while the pump carries out a self-test routine and initialises itself.

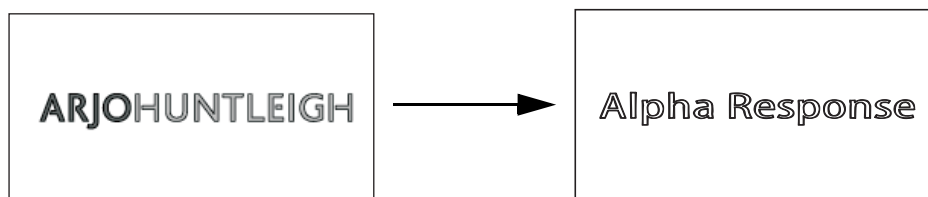


Figure 19 - Screen Logos

- 6.5 At the end of the start-up sequence, as no tubeset is connected, the pump should detect a **No Connection** alarm:
  - 6.5.1 The **No Mattress** and **No Seat** screens should alternate on the LCD screen (Figure 20).
  - 6.5.2 An audible alarm should sound.
  - 6.5.3 The LED indicator should flash red.

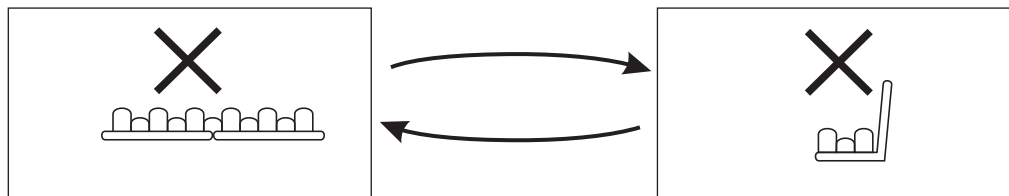
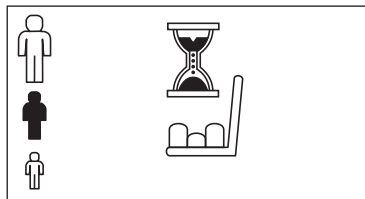


Figure 20 - No Connection Alarm

- 6.6 Connect a seat service adaptor (Fig 10, Item 60) to the pump outlet manifold:
  - 6.6.1 The **No Connection** alarm should be replaced by the default seat-inflation screen (Figure 21).
  - 6.6.2 The audible alarm should stop.
  - 6.6.3 The LED indicator should change to green.
  - 6.6.4 If the default seat-inflation screen is not displayed, then replace the outlet manifold assembly (Chapter 5 “Pump Repair”, Page 57, Section 14 and Chapter 5 “Pump Repair”, Page 57, Section 15).

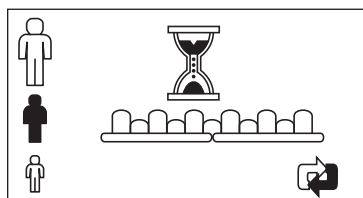


**Figure 21 - Seat Inflation Screen**

- 6.7 Disconnect the seat cushion connector and connect the mattress service tubeset assembly (Fig 9, Item 40) to the pump:

**Note:** The **No Connection** alarm will sound and be displayed while neither tubeset assembly is connected.

- 6.7.1 The default mattress-inflation screen should be displayed (Figure 22).
- 6.7.2 The LED indicator should be green.
- 6.7.3 If the default seat-inflation screen is not displayed, then replace the outlet manifold assembly (Chapter 5 "Pump Repair", Page 57, Section 14 and Chapter 5 "Pump Repair", Page 57, Section 15)



**Figure 22 - Mattress Inflation Screen**

- 6.8 With the pump running, disconnect the pump from the mains power supply. The pump should detect a **Power Fail** alarm:

- 6.8.1 The LCD screen should display the **Power Fail Alarm** screen (Figure 23).

**Note:** There is **no** LCD backlight.

- 6.8.2 An audible alarm should sound.
- 6.8.3 If the Power Fail Alarm does not operate correctly:
  - 6.8.3.1 Replace the power supply PCB assembly (Chapter 5 "Pump Repair", Page 67, Section 22 and Chapter 5 "Pump Repair", Page 67, Section 23).
  - 6.8.3.2 If it is still faulty, replace the display PCB assembly (Chapter 5 "Pump Repair", Page 61, Section 18 and Chapter 5 "Pump Repair", Page 62, Section 19).



**Figure 23 - Power Fail Alarm Screen**

- 6.9 Reconnect the pump to the mains power supply:
  - 6.9.1 The **Power Fail** alarm will be cleared.
  - 6.9.2 The default mattress-inflation screen should be displayed (Figure 21).
  - 6.9.3 The LED indicator should be green.
- 6.10 Press and hold the **Run/Standby** button for 3 seconds to put the pump into **Standby** (blank screen, amber LED).

## 7 Pump Flow and Pressure Tests

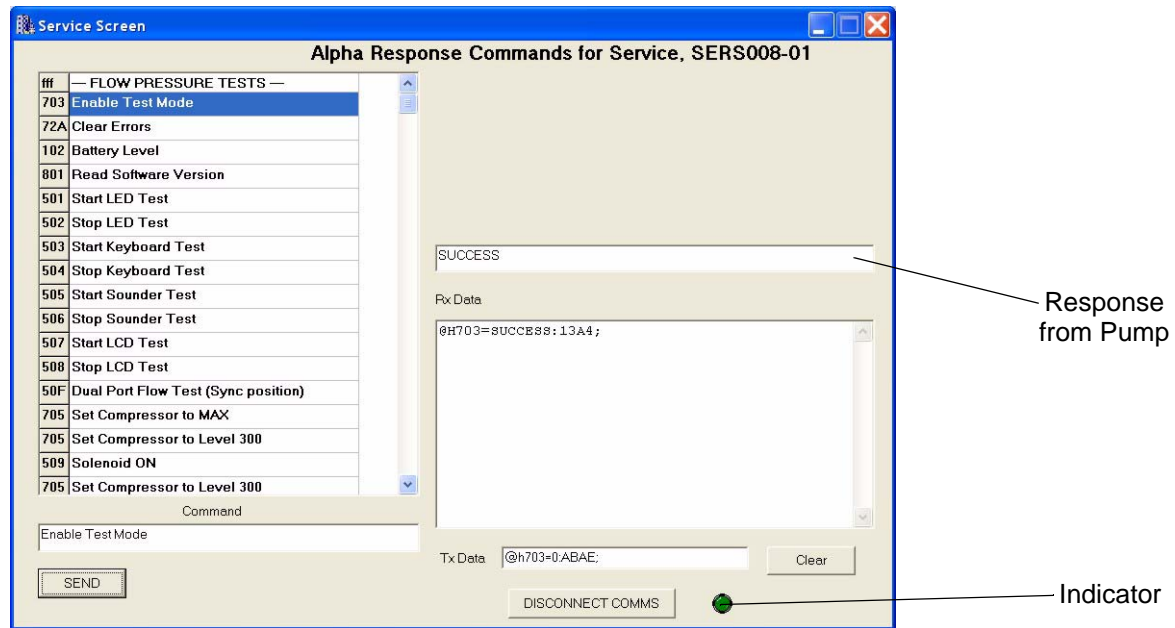
### Errors Detected During the Flow and Pressure Tests

- 7.1 During the following tests, if the results are not as specified in the procedure, then take the following actions:
- 7.1.1 If there any errors on the LED test, Keyboard test, Sounder test or LCD test then replace the display PCB assembly (Chapter 5 “Pump Repair”, Page 61, Section 18 and Chapter 5 “Pump Repair”, Page 62, Section 19).
  - 7.1.2 When measuring flows and pressures, if the flow is less than the minimum specified:
    - 7.1.2.1 Inspect for obstructions in the pump, and replace as necessary:
      - Blocked bio-filter (Chapter 5 “Pump Repair”, Page 69, Section 24).
      - Blocked compressor inlet filter (Chapter 5 “Pump Repair”, Page 53, Section 11).
      - Blocked case inlet filter (Chapter 5 “Pump Repair”, Page 46, Section 3).
    - 7.1.2.2 If the flow is still too low, replace the compressor and bracket assembly (Chapter 5 “Pump Repair”, Page 55, Section 12 and Chapter 5 “Pump Repair”, Page 55, Section 13).
  - 7.1.3 When measuring flows and pressures, if pressures vary between the flow/pressure rig and the LCD screen on the pump, then replace the display PCB assembly (Chapter 5 “Pump Repair”, Page 61, Section 18 and Chapter 5 “Pump Repair”, Page 62, Section 19).

### Basic Pump Tests

- 7.2 At all times during the test procedure the pump LCD screen should be as clear as possible. If it is not clear, carry out the procedure detailed in “Engineering Settings” on page 40 to adjust the contrast of the LCD screen.
- 7.3 Make sure the pump is powered up and in **Standby** (blank screen, amber LED):
- 7.3.1 If not powered up, connect the pump to the mains power supply; the pump will then be in **Standby**.
  - 7.3.2 If powered up and in the **Run** mode, press and hold the **Run/Standby** button for 3 seconds; the pump will go into **Standby**.
- 7.4 Set up the TAPP Communicator as follows (refer to Section 4, Page 25 “Setting up the TAPP Communicator”):
- 7.4.1 Connect the pump to the PC using the USB adaptor cable (Table 5, Item 30).
  - 7.4.2 Start the TAPP Communicator software running on the PC.
  - 7.4.3 Make sure the comms port is activated by clicking **CONNECT COMMS** at the bottom of the screen (refer to Figure 24):
    - The indicator to the right of **CONNECT COMMS** will change from red to green.
    - The text on the button will change to **DISCONNECT COMMS**.
- Note:** *The TAPP Communicator can now interrogate the pump and send commands to it.*
- 7.5 If the comms port is not activated correctly and there are communication problems between the pump and the TAPP Communicator, then refer to Section 4, Page 25 “Setting up the TAPP Communicator”.
- 7.6 Refer to Section 5, Page 29 “Description of TAPP Communicator Service Screen”, for a description of the buttons and text boxes on the screen.
- Note:** *The list of commands on the TAPP Communicator screen are in the order of this test.*
- 7.7 The first set of commands listed will be **FLOW PRESSURE TESTS**.
- 7.8 To carry out the test procedure, send the following commands in the order stated and make sure that the correct messages are displayed on the TAPP Communicator screen and the pump LCD screen.





**Figure 24 - TAPP Communicator: Enable Test Mode Command**

- 7.9 To send a command to the pump, do the following:
- 7.9.1 Highlight the command in the command list.
  - 7.9.2 Click the **SEND** button or double-click the highlighted command.
  - 7.9.3 Confirm that the command has been received successfully by the pump: the **Response** box should say **SUCCESS** after every command has been sent.
- 7.10 **703: Enable Test Mode:**
- 7.10.1 The **Response** box on the TAPP Communicator should say **SUCCESS** and the pump LCD screen should show **Engineers Tests**, to indicate a successful command transfer.
  - 7.10.2 If the command is not received successfully, then the comms port may not have been activated correctly; repeat Section 4, Page 25 "Setting up the TAPP Communicator".
- 7.11 **72A: Clear Errors.**
- 7.12 **102: Battery Level:**
- 7.12.1 The **Response** box on the TAPP Communicator will indicate whether the Battery Level is within limits e.g. **Battery Level (730) is within acceptable range (537 to 806)**.  
**Note:** The response does not include **SUCCESS**.
  - 7.12.2 In the event of failure, replace the rechargeable battery on the display PCB assembly (refer to Chapter 5 "Pump Repair", Page 64, Section 20).
  - 7.12.3 If it still fails, then replace the display PCB assembly (Chapter 5 "Pump Repair", Page 61, Section 18 and Chapter 5 "Pump Repair", Page 62, Section 19).
- 7.13 **801: Read Software Version.** Examine the **Response** box on the TAPP Communicator for the correct version of software: **VX.XXXX-YYY**, where:
- **X.XXXX** is the version number.
  - **YYY** is either **ROW** or **USA**.
  - For example: **V1.0001-ROW**.
- Note:** The response does not include **SUCCESS**.
- 7.14 **501: Start LED Test:**
- 7.14.1 The pump LCD screen will display **Engineers Tests** and **LED\_TEST**.
  - 7.14.2 The **Run/Standby** LED should change colour in the following sequence:  
Red - Green - Amber - Off.
- 7.15 **502: Stop LED Test.** The pump LCD screen will display **Engineers Tests**.

7.16 **503: Start Keyboard Test:**

7.16.1 The pump LCD screen will display **Engineers Tests** and **BUTTON\_TEST**.

7.16.2 Press each key on the membrane control panel, including "hidden" buttons, and make sure the correct text is displayed on the pump LCD screen (refer to Figure 25 and Table 7).

7.17 **504: Stop Keyboard Test.** The pump LCD screen will display **Engineers Tests**.

7.18 **505: Start Sounder Test:**

7.18.1 The pump LCD screen will display **Engineers Tests** and **SOUND\_TEST**.

7.18.2 The sounder should sound various alarms; none should be distorted.

7.19 **506: Stop Sounder Test.** The pump LCD screen will display **Engineers Tests**.

7.20 **507: Start LCD Test:**

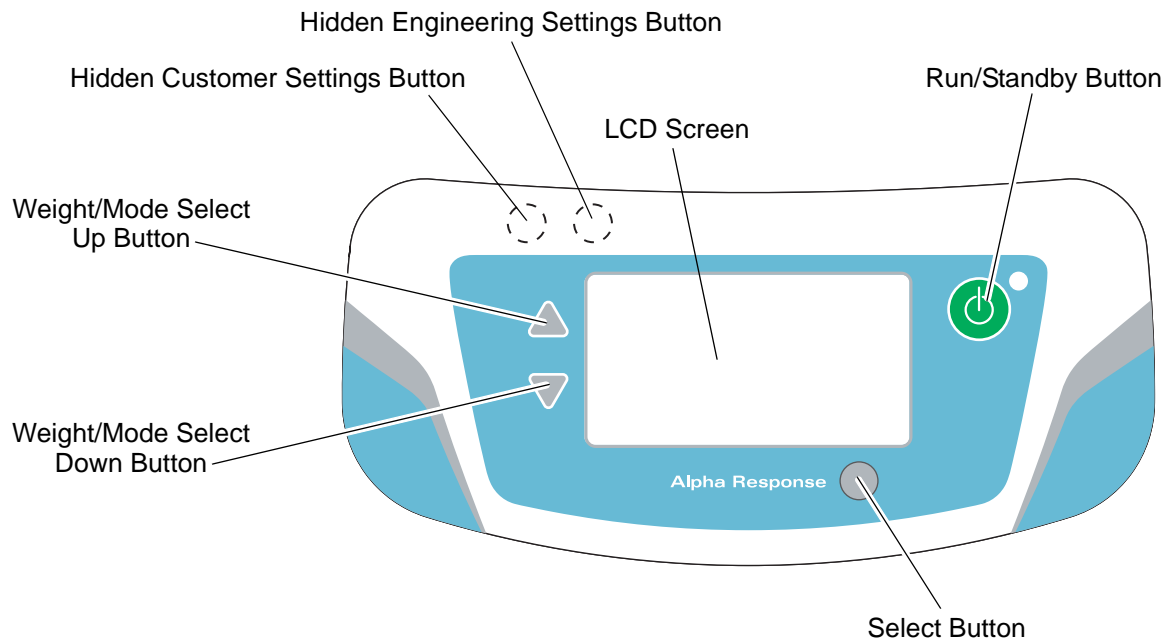
7.20.1 The pump LCD screen will display **Engineers Tests** and **LCD\_TEST**.

7.20.2 The LCD screen will cycle through 3 screens:  
Plain backlight - Full dark - Set of patterns.

7.20.3 The LCD contrast will vary, and the engineer is looking for dots on the LCD screen which are missing or stuck on.

**Note:** Graphics should change every 6 to 10 seconds.

7.21 **508: Stop LCD Test.** The pump LCD screen will display **Engineers Tests**.



**Figure 25 - Keyboard Test**

**Table 7 - Keyboard Test**

Button Pressed	LCD Screen Text
Run/Standby	POWER BUTTON
Select	OK BUTTON
Weight/Mode Select Up	FORWARD BUTTON
Weight/Mode Select Down	BACK BUTTON
Hidden Customer Settings	CUSTOMER BUTTON
Hidden Engineering Settings	ENGINEERING BUTTON

## Flow and Pressure Tests

7.22 Input the following two commands together - the second immediately after the first:

7.22.1 **50F: Dual Port Flow Test (Sync Position).**

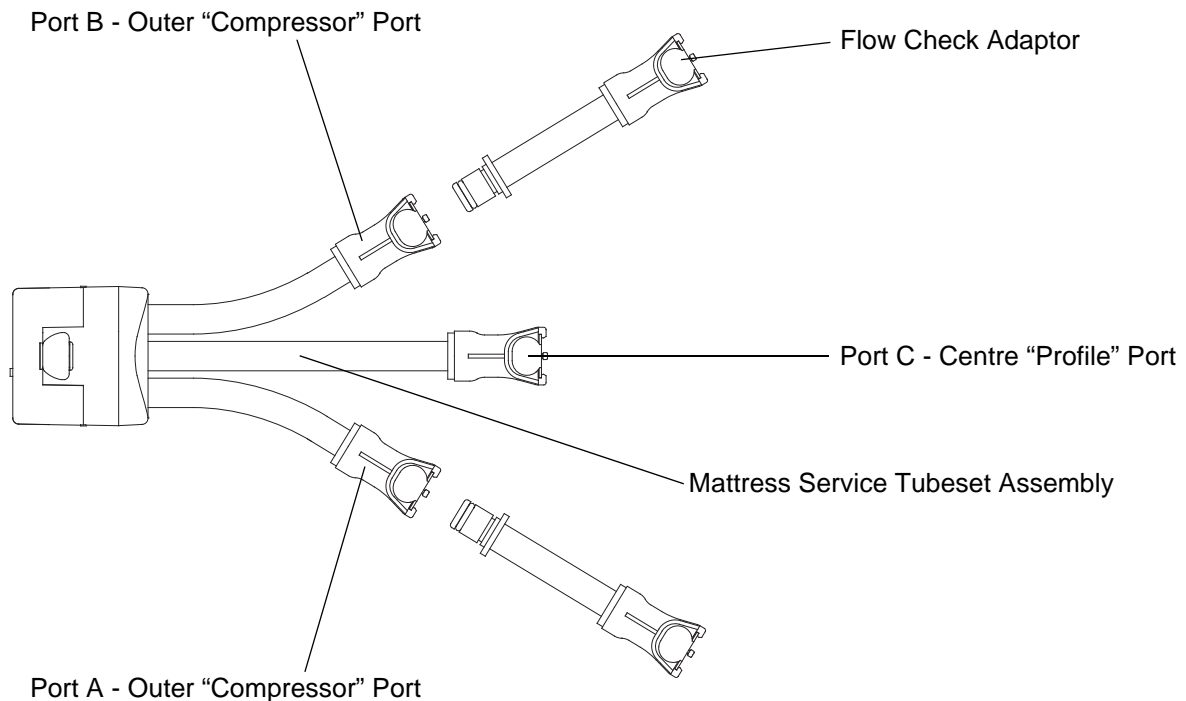
7.22.2 **705: Set Compressor to MAX** (Level 700, Frequency 54):

7.22.2.1 The pump LCD screen will display **Engineers Tests** and **SYNC MOTOR RUNNING TO DUAL PORT POSITION**, and will also display an elapsed time indicator.

7.22.2.2 An audible sound will indicate that the **Dual Port** position has been reached; the pump LCD screen will display **Engineers Tests** and **ROTOR IN DUAL PORT AIR FLOW POSITION**, and will also show **Compressor** and **Profile** pressures in mmHg (Figure 27).

**Note:** This action may take up to 5 minutes depending upon the position of the sync motor at the start of the test.

7.23 Make sure the mattress service tubeset assembly (Fig 9, Item 40) is still connected to the pump. Connect a flow check adaptor (Fig 9, Item 50) to the end of both outer tubes, ports A and B (Figure 26).



**Figure 26 - Mattress Service Tubeset Assembly with Flow Check Adaptors**

7.24 Make sure the valve on the flow/pressure rig (Fig 9, Item 70) is fully open, and then connect it to the flow check adaptor on port A on the mattress service tubeset.

7.25 The peak flow should be greater than **2.5 LPM**; record the flow measurement.

**Note:** This value will be compared in Para 7.27.

7.26 Disconnect the flow/pressure rig from port A and connect it to the flow check adaptor on port B on the tubeset.

7.27 The peak flow should be greater than **2.5 LPM**. Note the flow measurement. The value for port B should be within **1.0 LPM** of the value for port A.

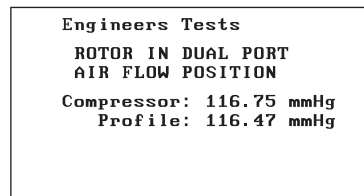
7.28 If the values for ports A and B are not within **1.0 LPM** of each other, then replace the motor & pressure module assembly (Chapter 5 "Pump Repair", Page 59, Section 16 and Chapter 5 "Pump Repair", Page 59, Section 17).

7.29 **705: Set Compressor to Level 300** (Level 300, Frequency 54).

7.30 Close the valve on the flow/pressure rig, and wait approximately 10 seconds.

- 7.31 Remove the flow/pressure rig and both flow check adaptors from ports A and B.
- 7.32 Connect a flow check adaptor to port C (centre **Profile** port) and connect the flow/pressure rig to the flow check adaptor.
- 7.33 Record the **Compressor** and **Profile** pressures on the pump LCD screen (Figure 27); the values should be greater than **60 mmHg** and also within  $\pm 4$  mmHg of the pressure value on the flow/pressure rig.

**Note:** These values will be compared in Paras 7.40 and 7.43 below.

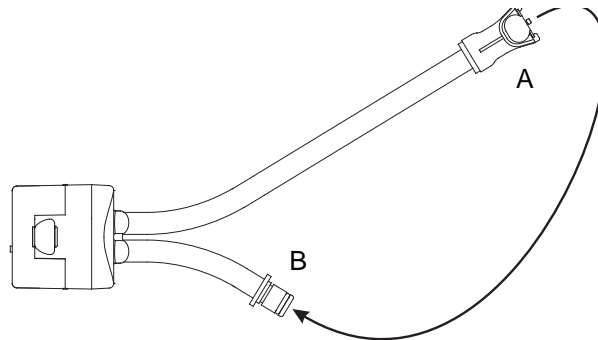


**Figure 27 - Engineering Test Screen: Typical Pressures**

- 7.34 Leave the flow check adaptor connected to port C, but remove the flow/pressure rig from the flow check adaptor.
- 7.35 Wait approximately 5 seconds, and read the pressure values on the pump LCD screen:
  - 7.35.1 The **Compressor** value should not drop below **60 mmHg**.
  - 7.35.2 The **Profile** value should drop to less than **2.5 mmHg**.
- 7.36 Remove the flow check adaptor from port C, and connect the flow/pressure rig directly to port C.
- 7.37 Wait for approximately 10 seconds.
- 7.38 **509: Solenoid ON.** The pump LCD screen will display **Engineers Tests**.
- 7.39 **705: Set Compressor to Level 300** (Level 300, Frequency 54).
- 7.40 **70A: Read Pressure:**
  - 7.40.1 Examine the **Response** box on the TAPP Communicator for the pressure read from the pump e.g. **SUCCESS|8.70|**, where **8.70** is the pressure in mmHg.
  - 7.40.2 The value in the **Response** box should be at least **20 mmHg** lower than the values recorded in Para 7.33, above.
- Note:** This value can often be 70-90 mmHg lower.
- 7.41 **50A: Solenoid OFF.**
- 7.42 Wait approximately 5 seconds.
- 7.43 **70A: Read Pressure:**
  - 7.43.1 Examine the **Response** box on the TAPP Communicator for the pressure read from the pump e.g. **SUCCESS|115.2|**, where **115.2** is the pressure in mmHg.
  - 7.43.2 The value in the **Response** box can be higher than the value recorded in Para 7.33, above, but must be no more than **3 mmHg** lower than that recorded in Para 7.33.
- 7.44 **510: Single Port Flow Test (Sync + 2 mins):**
  - 7.44.1 The pump LCD screen will display **Engineers Tests** and **SYNC MOTOR RUNNING TO SINGLE PORT POSITION**, and will also display an elapsed time indicator.
  - 7.44.2 An audible sound will indicate that the Single Port position has been reached. The pump LCD screen will display **Engineers Tests** and **ROTOR IN SINGLE PORT AIR FLOW POSITION**.
- Note:** This action may take up to 5 minutes depending upon the position of the sync motor at the start of the test.
- 7.45 **705: Set Compressor to MAX** (Level 700, Frequency 54).
- 7.46 Remove the flow/pressure rig from port C.
- 7.47 Make sure the valve on the flow/pressure rig is closed, and alternately connect it to ports A and B to confirm which port is active (i.e. has air flowing out of it), and connect it to the active port.
- 7.48 The pressure should be greater than **100 mmHg**.
- 7.49 Fully open the valve on the flow/pressure rig; the peak flow should be greater than **7.5 LPM**.
- 7.50 Adjust the valve on the flow/pressure rig until the pressure reads approximately **73 mmHg**.

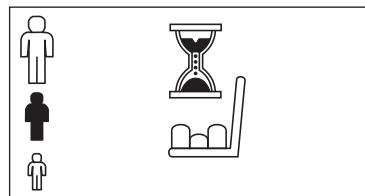
- 7.51 The flow must be greater than **4 LPM**.
- 7.52 Close the valve on the flow/pressure rig.
- 7.53 **50F: Dual Port Flow Test (Sync position):**
- 7.53.1 The pump LCD screen will display **Engineers Tests** and **SYNC MOTOR RUNNING TO DUAL PORT POSITION**, and will also display an elapsed time indicator.
- 7.53.2 An audible sound will indicate that the Dual Port position has been reached. The pump LCD screen will display **Engineers Tests** and **ROTOR IN DUAL PORT AIR FLOW POSITION**. The LCD screen will also show **Compressor** and **Profile** pressures.
- Note:** *This action may take up to 5 minutes depending upon the position of the sync motor at the start of the test.*
- 7.54 It is not necessary to take any readings; input the next command sequence.
- 7.55 Input the following two commands together - the second immediately after the first:
- 7.55.1 **510: Single Port Flow Test (Sync + 2 mins).**
- 7.55.2 **705: Set Compressor to MAX** (Level 700, Frequency 54):
- 7.55.2.1 The pump LCD screen will display **Engineers Tests** and **SYNC MOTOR RUNNING TO SINGLE PORT POSITION**, and will also display an elapsed time indicator.
- 7.55.2.2 An audible sound will indicate that the **Dual Port** position has been reached; the pump LCD screen will display **Engineers Tests** and **ROTOR IN SINGLE PORT AIR FLOW POSITION**, and will also show **Compressor** and **Profile** pressures in mmHg (Figure 27).
- Note:** *This action may take up to 5 minutes depending upon the position of the sync motor at the start of the test.*
- 7.56 Remove the flow/pressure rig from the previous active port identified in Para 7.47, and connect to the “opposite” compressor port e.g. if port A was active before, connect to port B.
- Note:** *Make sure the selected active port has air flowing out of it.*
- 7.57 The pressure should be greater than **100 mmHg**.
- 7.58 Fully open the valve on the flow/pressure rig; the peak flow should be greater than **7.5 LPM**.
- 7.59 Adjust the valve on the flow/pressure rig until the pressure reads approximately **73 mmHg**.
- 7.60 The flow must be greater than **4 LPM**.
- 7.61 Close the valve on the flow/pressure rig.
- 7.62 **705: Set Compressor OFF.** The **Response** box on the TAPP Communicator displays **COMPRESSOR FREQ OUT OF RANGE** and the compressor in the pump stops running.
- 7.63 **78C: Read Errors:**
- 7.63.1 The **Response** box on the TAPP Communicator should display zero errors i.e. **SUCCESS (0x0000)**.
- 7.63.2 If the **Response** box displays any errors (e.g. **0x0010**), the pump is faulty. To diagnose the fault:
- 7.63.2.1 Refer to Chapter 2 “Troubleshooting”, Page 15, Table 2.
- 7.63.2.2 Refer to Chapter 2 “Troubleshooting”, Page 17, “Communicator Error Codes for Multiple Faults”.
- 7.64 **72A: Clear Errors.** Clearing errors resets any internal error counts of any events logged during the test.
- 7.65 **72B: Clear System Counters.**
- 7.66 **30A: Clear Hours Run.**
- 7.67 **403: Clear Customer Hours.**
- 7.68 **202: Set Service Hours.** This sets the hours counter to indicate when the next service is due.
- 7.69 If any of the following pump sub-assemblies have been replaced during the pump service, refer to Page 39, “Setting Serial Numbers for New Sub-Assemblies” to enter the new serial number(s) into the pump software:
- Power supply PCB assembly.
  - Compressor & bracket assembly.

- 7.70 **704: Disable Test Mode.** The pump should be in **Standby** (blank screen, amber LED).
- 7.71 To deactivate the comms port, click **DISCONNECT COMMS** at the bottom of the TAPP Communicator screen.
- 7.72 Remove the USB adaptor lead from the pump and insert the USB cover into the slot in the top rear of the pump (Figure 11).
- 7.73 Remove the mattress service tubeset assembly from the pump and connect the seat service adaptor (Figure 28).
- 7.74 Connect the two output connectors A and B together on the seat service adaptor (Figure 28).



**Figure 28 - Connecting the Outputs on the Seat Service Adaptor**

- 7.75 Press the Run/Standby button to put the pump into the **Run** mode:
  - 7.75.1 The LED indicator should change to green.
  - 7.75.2 The LCD screen should display the ArjoHuntleigh logo followed by the **Alpha RESPONSE** animated logo (Figure 19), while the pump carries out a self-test routine and initialises itself.
- 7.76 At the end of the start-up sequence, the default seat-inflation screen should be displayed (Figure 29).



**Figure 29 - Seat Inflation Screen**

- 7.77 Disconnect connector A from connector B on the seat service adaptor.
- 7.78 The pump should *eventually* detect a **Low Pressure** alarm:

- 7.78.1 The LCD screen should display the **Low Pressure** screen.



- 7.78.2 An audible alarm should sound.
- 7.78.3 If the **Low Pressure** Alarm does not operate correctly, replace the display PCB assembly (Chapter 5 "Pump Repair", Page 61, Section 18 and Chapter 5 "Pump Repair", Page 62, Section 19).

- 7.79 Press and hold the **Run/Standby** button for 3 seconds:
  - 7.79.1 The **Low Pressure** alarm will be cleared.
  - 7.79.2 The pump should go into **Standby** (blank screen, amber LED).
- 7.80 Disconnect the mains power from the pump.
- 7.81 End of procedure

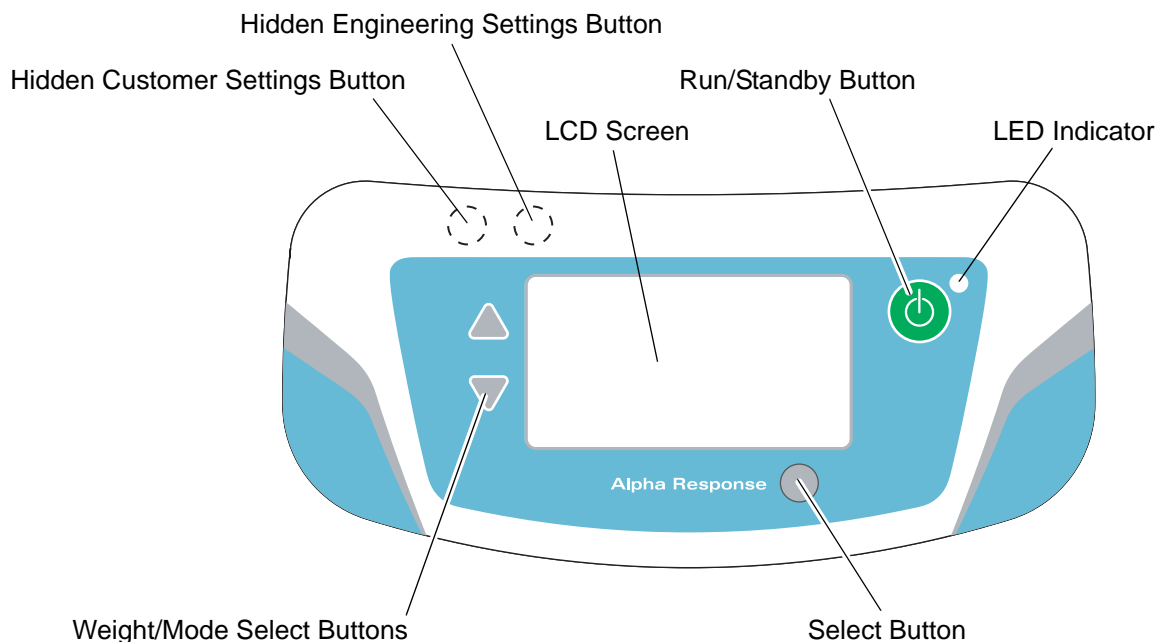
## 8 Setting Serial Numbers for New Sub-Assemblies

- 8.1 Make sure the pump is still in **Standby** (blank screen, amber LED). If not, press and hold the **Run/Standby** button for 3 seconds; the pump will go into **Standby**.
- 8.2 Go down the list of commands on the TAPP Communicator to the group headed **MANUFACTURE** and send the following commands:
  - 8.2.1 To enter a new compressor serial number:
    - 8.2.1.1 Select but do not send **308: Set Compressor Serial No.**
    - 8.2.1.2 In the **Serial Number** parameter field, type in the new serial number.
    - 8.2.1.3 Click **SEND** to send command **308** and the serial number to the pump.
  - 8.2.2 To enter a new power supply PCB serial number:
    - 8.2.2.1 Select but do not send **309: Set Power Supply PCB Serial No.**
    - 8.2.2.2 In the **Serial Number** parameter field, type in the new serial number.
    - 8.2.2.3 Click **SEND** to send command **309** and the serial number to the pump.
- 8.3 If you need to confirm the serial numbers which have been sent to the pump, do the following:
  - 8.3.1 Send **300: Read Manufacture Data**.
  - 8.3.2 The Communicator response window **Rx Data** will show a text string, which will have **SUCCESS** followed by 6 text values separated by "|", as follows:  
**SUCCESS|T1|T2|T3|T4|T5|T6|**  
A typical example of the text string will be:  
**SUCCESS|0900004821|464001|COM0899008|UA00108|11/11/2009|3|**
    - T1 = Pump serial number (e.g. 0900004821).
    - T2 = Pump model number (e.g. 464001).
    - T3 = Compressor assembly serial number (e.g. COM0899008).
    - T4 = Power supply PCB assembly serial number (e.g. UA00108).
    - T5 = Date of manufacture of pump (e.g. 11/11/2009).
    - T6 = Run hours (e.g. 3).

**Note:** *There is no text value for the display PCB assembly serial number.*
- 8.4 To deactivate the comms port, click **DISCONNECT COMMS** at the bottom of the TAPP Communicator screen.
- 8.5 End of procedure

## 9 Engineering Settings

- 9.1 Make sure the pump is powered up and in **Standby** (blank screen, amber LED):
- 9.1.1 If not powered up, connect the pump to the mains power supply; the pump will then be in **Standby**.
  - 9.1.2 If powered up and in the **Run** mode, press and hold the **Run/Standby** button for 3 seconds; the pump will go into **Standby**.

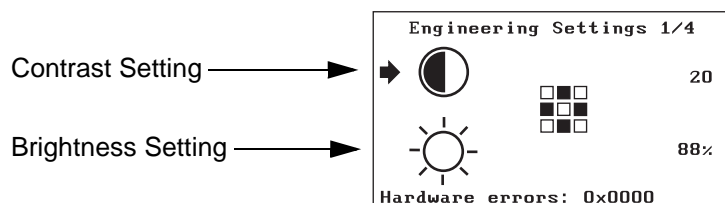


**Figure 30 - Pump Control Panel and Position of Hidden Buttons**

- 9.2 Press and hold the hidden Engineering Settings button (right hidden button, Figure 30). After approximately 5 seconds, the Engineering Settings screen should be displayed (Figure 31) and the LED indicator should flash amber.
- 9.3 To adjust the contrast, go to "Contrast Adjustment" on page 40.
- 9.4 To change the Bed profile Status, go to "Bed Profile (Applicable to RoW Pumps only)" on page 41.

### Contrast Adjustment

- 9.5 Make sure that Engineering Settings 1/4 screen is displayed (Figure 31).
- 9.6 Inspect the "chequerboard" icon in the centre of the LCD screen and adjust the contrast to make the display as clear as possible. Refer to Figure 32 for typical contrast levels.

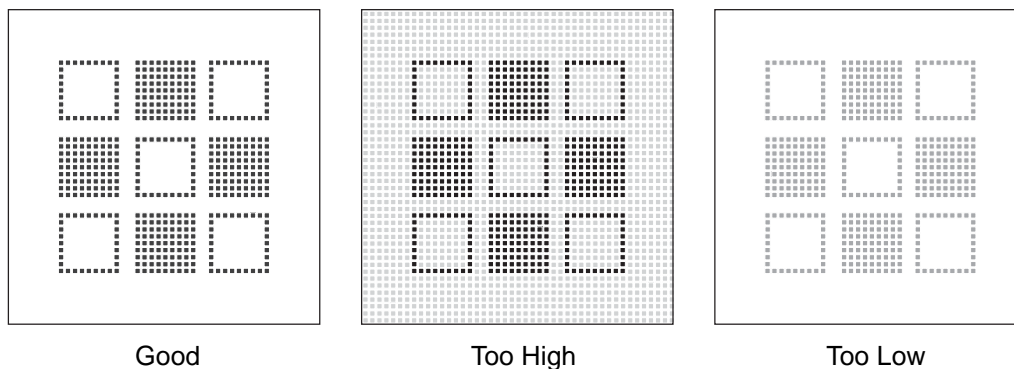


**Figure 31 - Engineering Settings Screen 1 of 4**

- 9.7 To adjust the contrast level:
- 9.7.1 Make sure the arrow on the left side of the screen points to the top "contrast" icon (Figure 31). If not, press the **Weight/Mode Select** buttons to move the pointer.
  - 9.7.2 Press the **Select** button to highlight the current contrast level.



- 9.7.3 Use the **Weight/Mode Select** buttons to adjust the contrast until the desired level is achieved (Figure 32).
- 9.7.4 Press the Select button to confirm the new contrast level.
- 9.8 Briefly press the hidden Engineering Settings button (Figure 30) to exit the Engineering Settings. The pump should go into Standby (blank screen, amber LED).

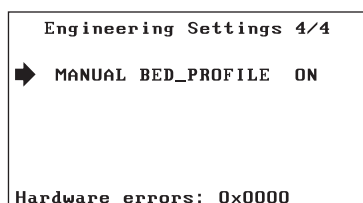


**Figure 32 - Contrast Levels**

### Bed Profile (Applicable to RoW Pumps only)

**Note:** All RoW pump variants (including UK and Euro) need the Manual Bed Profile set to OFF.

- 9.9 Use the Weight/Mode Select buttons until Engineering Settings 4/4 screen is displayed (Figure 33).



**Figure 33 - Engineering Settings Screen 4 of 4**

- 9.10 Examine the current Bed Profile Status (ON or OFF):
  - 9.10.1 If the Bed Profile Status is OFF:
    - 9.10.1.1 Briefly press the hidden Engineering Settings button (Figure 30) to exit the Engineering Settings.
    - 9.10.1.2 The pump should go into **Standby** (blank screen, amber LED).
  - 9.10.2 If the Bed Profile Status is ON:
    - 9.10.2.1 Press the Select button to highlight the current Bed Profile Status.
    - 9.10.2.2 Use the Weight/Mode Select buttons to set the Bed Profile Status to OFF.
    - 9.10.2.3 Press the Select button to confirm the new Bed Profile Status.
    - 9.10.2.4 Briefly press the hidden Engineering Settings button (Figure 30) to exit the Engineering Settings.
    - 9.10.2.5 The pump should go into **Standby** (blank screen, amber LED).

## 10 Electrical Safety Testing

### Test Equipment

To test the pump correctly, the test equipment in Table 8 is required.

**Note:** All test equipment must be calibrated to national or international standards.

Table 8 - Electrical Test Equipment

Item	Test Equipment
10	Insulation Resistance Tester (Megger), 500 Vdc
20	Portable Appliance Tester
30	Dielectric Strength Tester (Flash Tester), 3.0 kVac with current limit

### Electrical Safety Checks - Class II (Double Insulated)

The following electrical safety checks must be carried out after breakdown repairs and servicing. Where alternatives are given, the test will depend upon the available test equipment.

- Insulation Resistance Test (Megger Test)
- Dielectric Strength (Flash Test)

#### Insulation Resistance Test

This tests the integrity of the appliance's insulation. This test is applied between the live and neutral wires (connected together) and the appliance's enclosure.

##### Test Procedure

- 500 Vdc is applied to the insulation and the measured resistance must be greater than 2M $\Omega$ .

**Note:** 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 a.c. voltage stress, indicates the effects of capacitive current, and gives an early warning of insulation problems which may develop in the appliance.

**CAUTION:** 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.

##### Test Procedure

- 4 kVac is applied between the live and neutral wires (connected together) and the appliance's non-earthed enclosure. No breakdown should occur.

## 11 Inflation Test of the Mattress Replacement, Overlay or Seat Cushion

This procedure must be carried out after a service or major repair of the mattress replacement, mattress overlay or seat cushion.

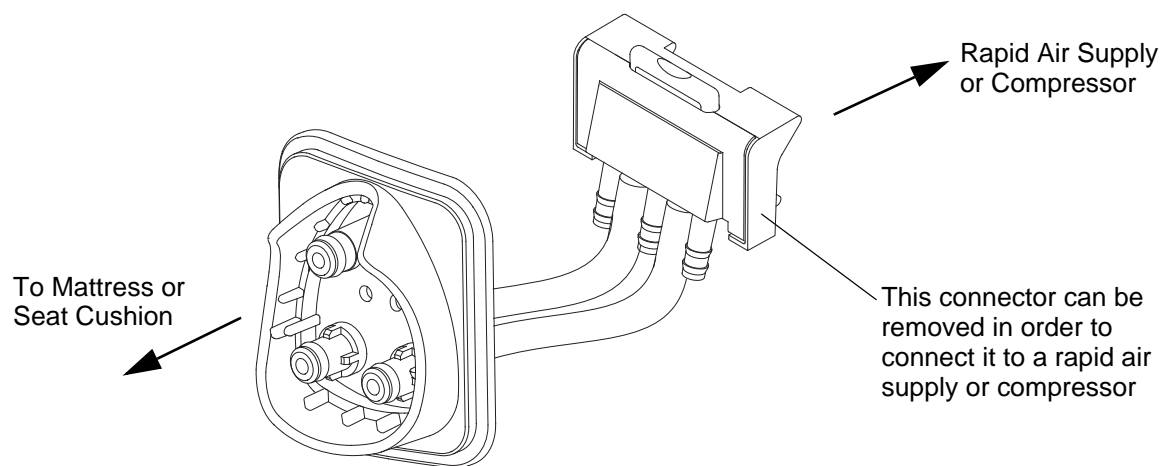
### Test Equipment

To test the mattress replacement, mattress overlay or seat cushion correctly, the test equipment in Table 9 is required.

**Note:** All test equipment must be calibrated to national or international standards.

**Table 9 - Mattress Replacement, Overlay and Seat Cushion Inflation Test Equipment**

Item	Test Equipment	Part Number	Qty
10	Flow / Pressure Rig, 3-26 ltr/min	PRE073	1
20	Inflation Adaptor	464247	1
30	Stopwatch	-	1



**Figure 34 - Inflation Adaptor**

**Test Procedure**

- 11.1 Connect a rapid air supply/compressor to the mattress replacement, mattress overlay or seat cushion using the inflation adaptor (Figure 34), or any part of it.
- 11.2 Fully inflate the cells on the mattress replacement, mattress overlay or seat cushion, and connect them to a pressure/flow meter.
- 11.3 Test the bank of cells to the requirements detailed in Table 10.

**Table 10 - Inflation Test Requirements**

Parameter	Value
Inflation test pressure:	80 - 90 mmHg
Inflation stabilisation period:	30 seconds
Inflation test period:	3 minutes
Leak rate:	Must not exceed 3 mmHg

- 11.4 If the mattress replacement, mattress overlay or seat cushion fails any of the tests, do the following:
  - 11.4.1 Investigate the cells, manifold, tubes, connectors, etc., as to the reason why.
  - 11.4.2 Repair any faults in accordance with the following:
    - Mattress Replacement: Refer to Chapter 6 "Mattress Replacement & Overlay Repair".
    - Seat Cushion: Refer to Chapter 7 "Seat Cushion Repair".
  - 11.4.3 Repeat the above test procedure to re-test the mattress replacement, mattress overlay or seat cushion after the repair (Refer to Page 43, Section 11).

## CHAPTER 5

### PUMP REPAIR

**WARNING:** *BEFORE PERFORMING ANY REPAIR PROCEDURES, MAKE SURE THAT THE PUMP HAS BEEN ADEQUATELY DECONTAMINATED.*

**WARNING:** *BEFORE DISASSEMBLING THE PUMP, MAKE SURE THE MAINS POWER CABLE HAS BEEN REMOVED FROM THE WALL SOCKET.*

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

#### 1 General

1.1 All repairs should be carried out by Huntleigh approved service personnel.

1.2 A Torx T10 screwdriver is required to carry out the repair procedures.

**Note:** *The shaft of the screwdriver must be at least 80mm long to reach the screw heads which secure the rear case assembly to the front case assembly.*

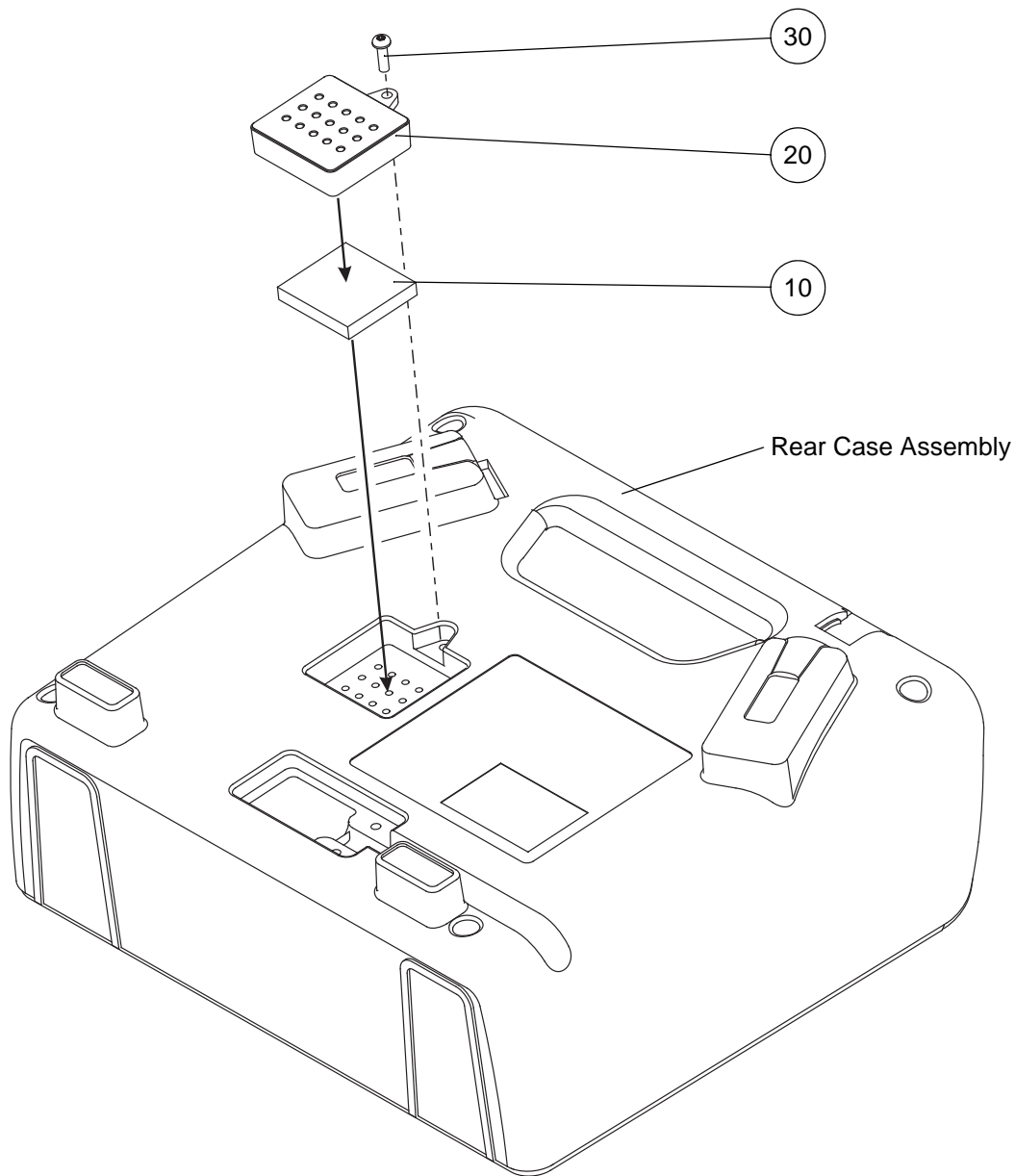
**Note:** *Do not use 0.25in. drive-bit type drivers as their diameter is too large.*

#### 2 Testing

**WARNING:** *BEFORE POWERING UP AND TESTING THE PUMP, MAKE SURE THE PUMP HAS BEEN COMPLETELY REASSEMBLED AND THE REAR CASE ASSEMBLY IS SECURED TO THE FRONT CASE ASSEMBLY.*

2.1 After all electrical and mechanical repairs to the pump, carry out the testing detailed in Chapter 4 "Testing", Page 23, "Pump Tests".

### 3 Replacing the Case Inlet Filter



**Figure 35 - Replacing the Case Inlet Filter**

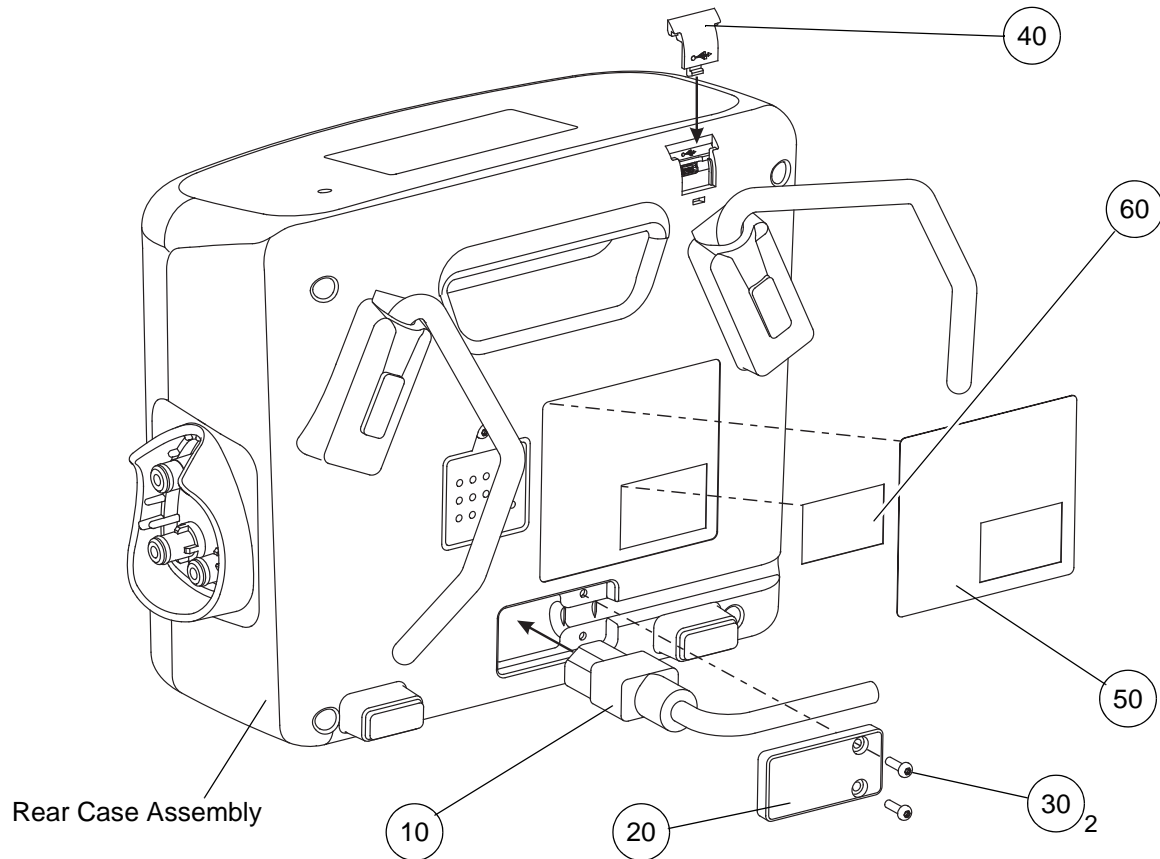
**Table 11 - Case Inlet Filter Parts List**

Item	Part Number	Description	Qty
10	507374	Filter Felt, Pump Inlet	1
20	630326	Filter Cover	1
30	FAS257	Screw, 3 dia x 10 long, Torx, Pan Head PT	1

#### 4 Replacing the Mains Power Cable, USB Cover and Rear Labels

**WARNING:** BEFORE REMOVING THE IEC CABLE COVER, MAKE SURE THE MAINS POWER CABLE HAS BEEN REMOVED FROM THE WALL SOCKET.

**CAUTION:** The static sensitive devices inside the pump can be seriously damaged by electrostatic discharge. Exercise caution when removing the USB cover.



**Figure 36 - Replacing the Mains Power Cable, USB Cover and Rear Labels**

**Table 12 - Mains Power Cable, USB Cover and Rear Labels Parts List**

Item	Part Number	Description	Qty
10	CAB305	Mains Power Cable, IEC, Straight Coiled, UK	1
-	CAB303	Mains Power Cable, IEC, Straight Coiled, Euro	1
-	CAB306	Mains Power Cable, IEC, Straight Coiled, USA	1
-	CAB307	Mains Power Cable, IEC, Straight Coiled, Orange Lead, Australia	1
-	CAB308	Mains Power Cable, IEC, Straight Coiled, Swiss	1
-	CAB311	Mains Power Cable, IEC, Straight Coiled, South African/Indian	1
-	CAB302	Mains Power Cable, Short, Male IEC to Female IEC	1
20	464402	IEC Cable Cover	1
30	FAS257	Screw, 3 dia x 10 long, Torx, Pan Head PT	2
40	464417	USB Cover	1
50	LAB405	Rear Label	1
60	REF	Serial Number Label	1

## 5 Replacing the Rear Case Assembly, Replacing the Rubber Feet

**WARNING:** BEFORE REMOVING THE REAR CASE ASSEMBLY, MAKE SURE THE MAINS POWER HAS BEEN REMOVED FROM THE PUMP.

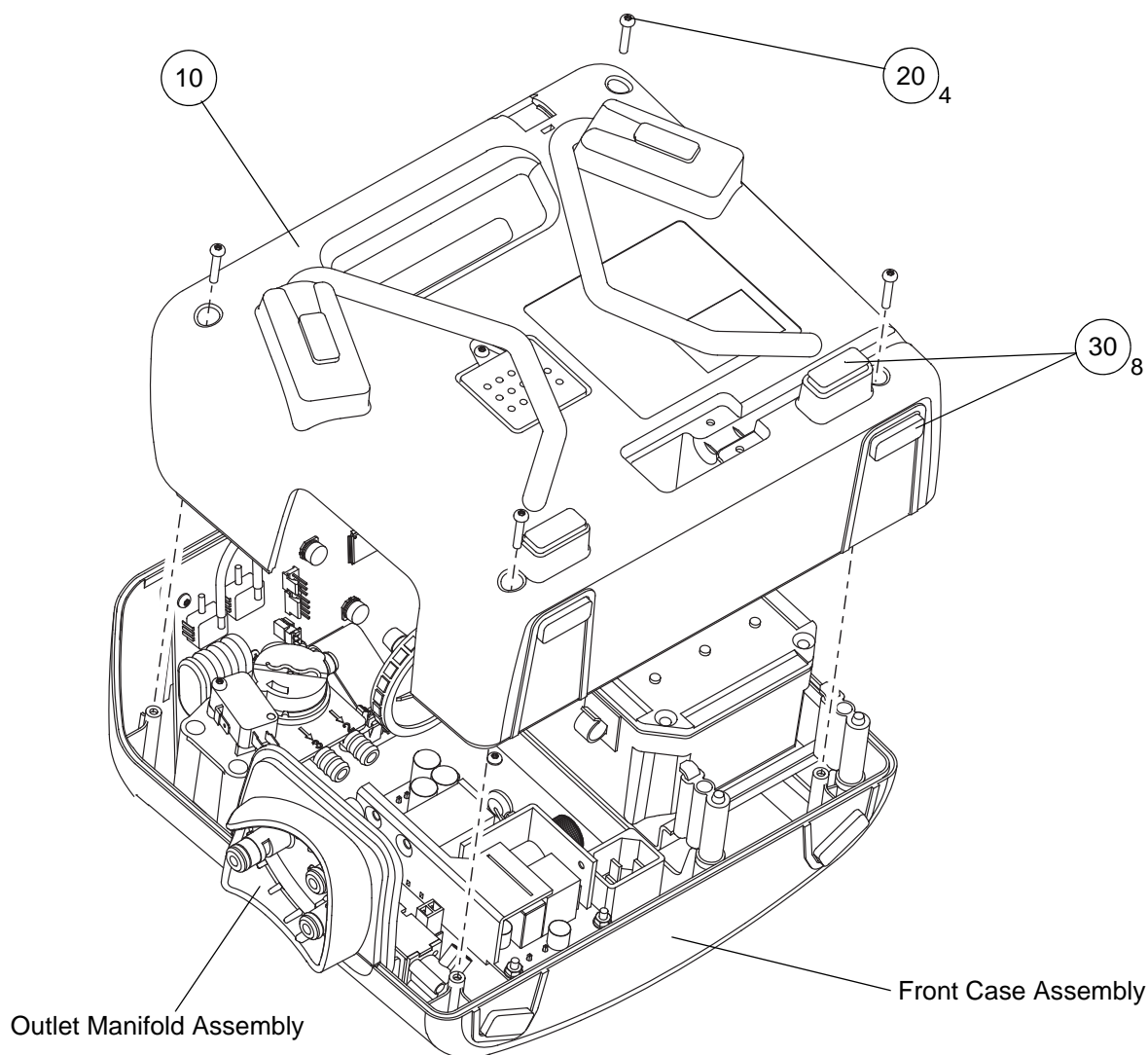
**CAUTION:** The static sensitive devices inside the pump can be seriously damaged by electrostatic discharge. Use anti-static protection when disassembling and repairing the pump.

5.1 Remove the mains power cable from the pump (refer to Page 47, Section 4).

5.2 Remove the 4 screws (Fig 37, Item 20) and the rear case assembly.

5.3 Installation is a reverse of the removal procedure.

**Note:** Make sure the outlet manifold assembly is in the cutout in the front case.



**Figure 37 - Removing the Rear Case Assembly, Replacing the Rubber Feet**

**Table 13 - Rear Case Assembly and Rubber Feet Parts List**

Item	Part Number	Description	Qty
10	464108	Rear Case Assembly	1
20	FAS258	Screw, 3 dia x 16 long, Torx, Pan Head PT	4
30	507413	Rubber Foot	8



6 Replacing the O-Rings on the Outlet Manifold Assembly

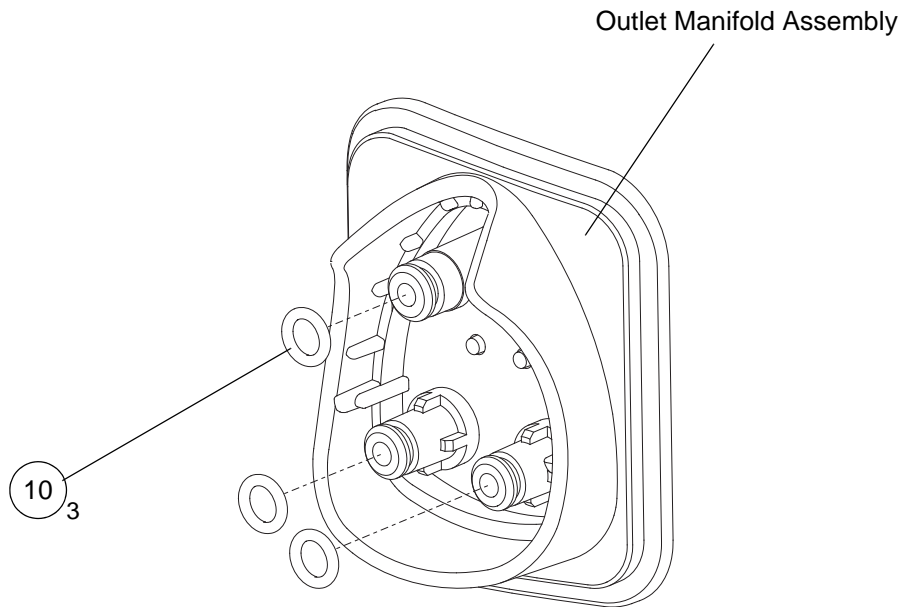


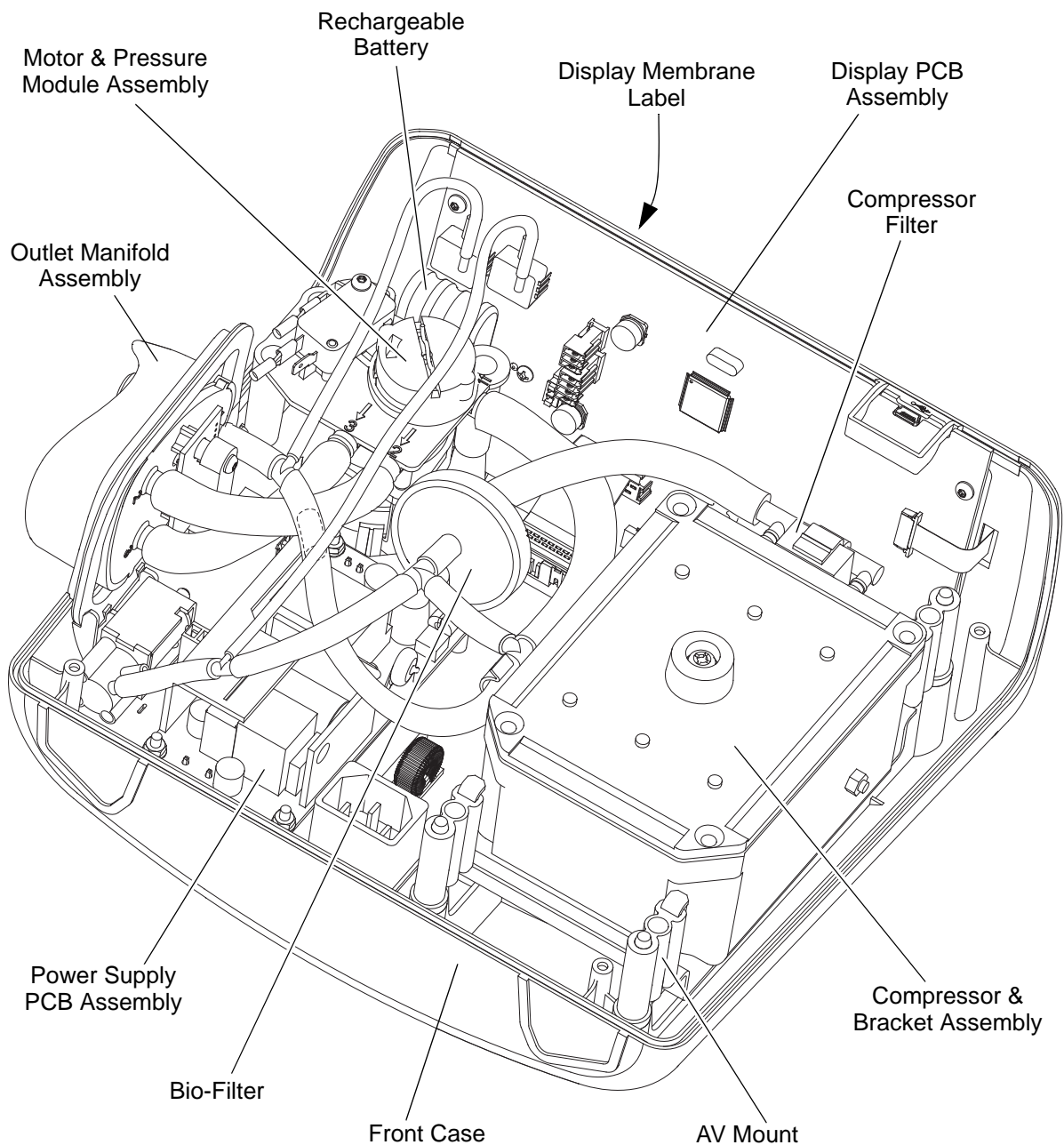
Figure 38 - Replacing the O-Rings on the Outlet Manifold Assembly

Table 14 - Rear Case Assembly Parts List

Item	Part Number	Description	Qty
10	630364	O-Ring, 6.8mm dia	3

## 7 Layout of Sub-Assemblies in the Front Case Assembly

- 7.1 Remove the rear case assembly from the front case assembly (refer to Page 48, Section 5).
- 7.2 Refer to Figure 39 for a layout of the sub-assemblies in the front case assembly.



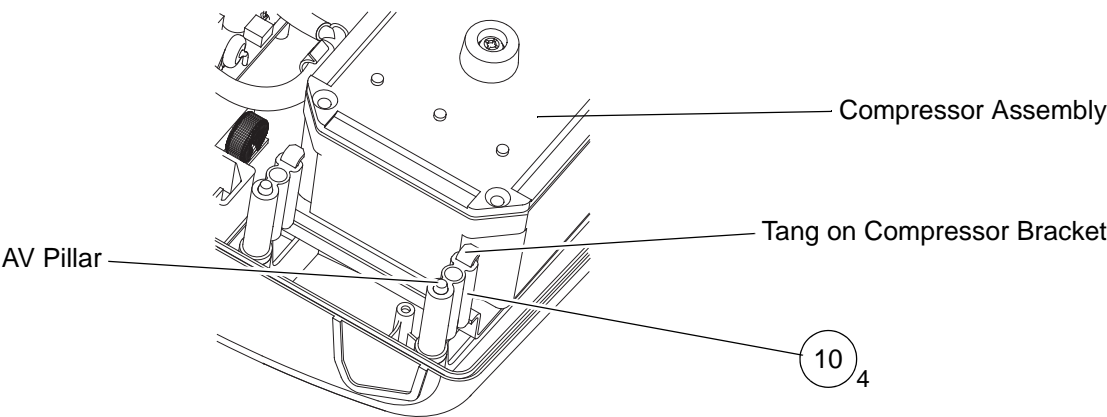
**Figure 39 - Layout of Sub-Assemblies in the Front Case Assembly**

**8 Removing the Compressor AV Mounts**

- 8.1 Remove the rear case assembly from the front case assembly (refer to Page 48, Section 5).
- 8.2 Hold the body of the compressor assembly, and starting at one corner of the compressor, carefully pull the AV mount (Fig 40, Item 10) off the AV pillar and the compressor bracket.
- 8.3 Repeat for the other 3 AV mounts.

**9 Installing the Compressor AV Mounts**

- 9.1 Inspect the 4 AV pillars and replace if necessary (refer to Page 52, Section 10).
- 9.2 Hold the body of the compressor assembly, and starting at one corner of the compressor, carefully push the new AV mount (Fig 40, Item 10) simultaneously over both the AV pillar and the bent tang on the compressor bracket.
- 9.3 Repeat for the other 3 AV mounts.
- 9.4 Install the rear case assembly onto the front case assembly (refer to Page 48, Section 5).



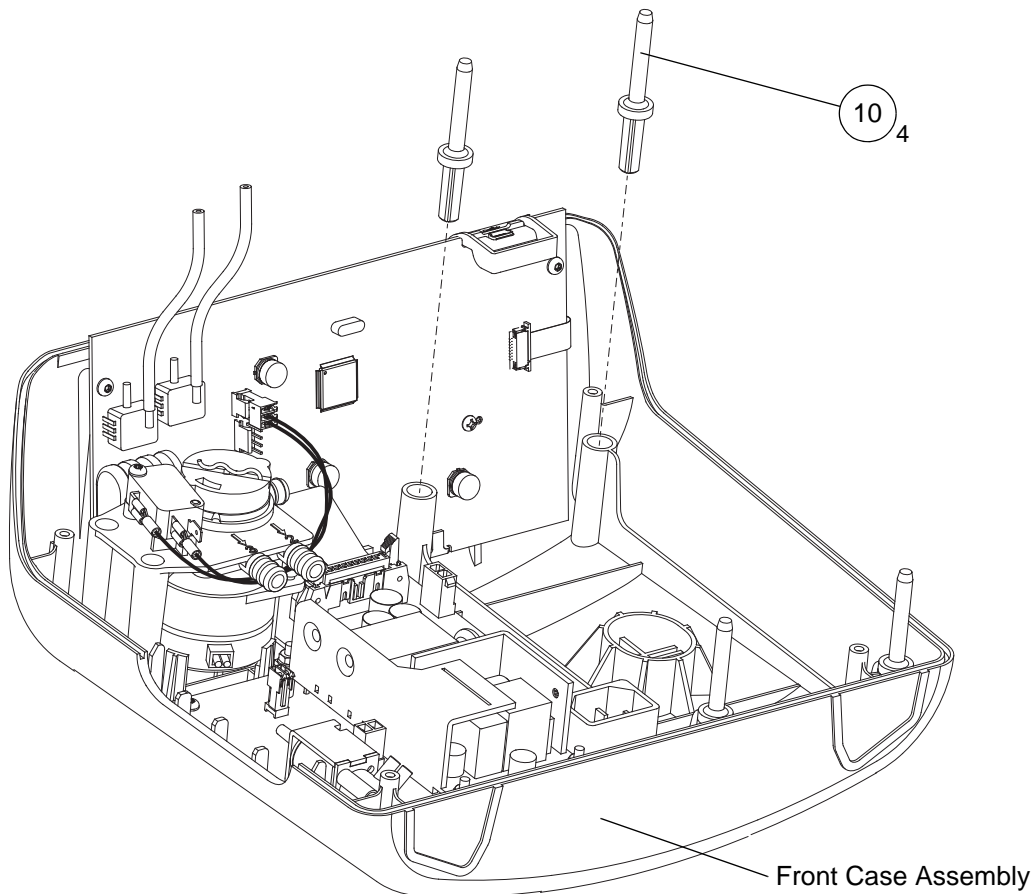
**Figure 40 - Replacing the Compressor AV Mounts**

**Table 15 - Rear Case Assemblyman Rubber Feet Parts List**

Item	Part Number	Description	Qty
10	500416	AV Mount	4

## 10 Replacing the AV Pillars

- 10.1 Remove the AV mounts from the AV pillars and the compressor bracket (refer to Page 51, Section 8).
- 10.2 Replace the AV pillars (Fig 41, Item 10).
- 10.3 Install the AV mounts onto the AV pillars and the compressor bracket (refer to Page 51, Section 9).



Note: Compressor assembly not shown for clarity.

**Figure 41 - Replacing the AV Pillars**

**Table 16 - Rear Case Assemblyman Rubber Feet Parts List**

Item	Part Number	Description	Qty
10	464425	AV Pillar	4

## 11 Replacing the Inlet Filter Felt on the Compressor Assembly

**Note:** The compressor inlet filter can be replaced without removing the compressor assembly.

11.1 Pull the filter clip (Fig 42, Item 20) off the F-tube on the rear of the compressor assembly.

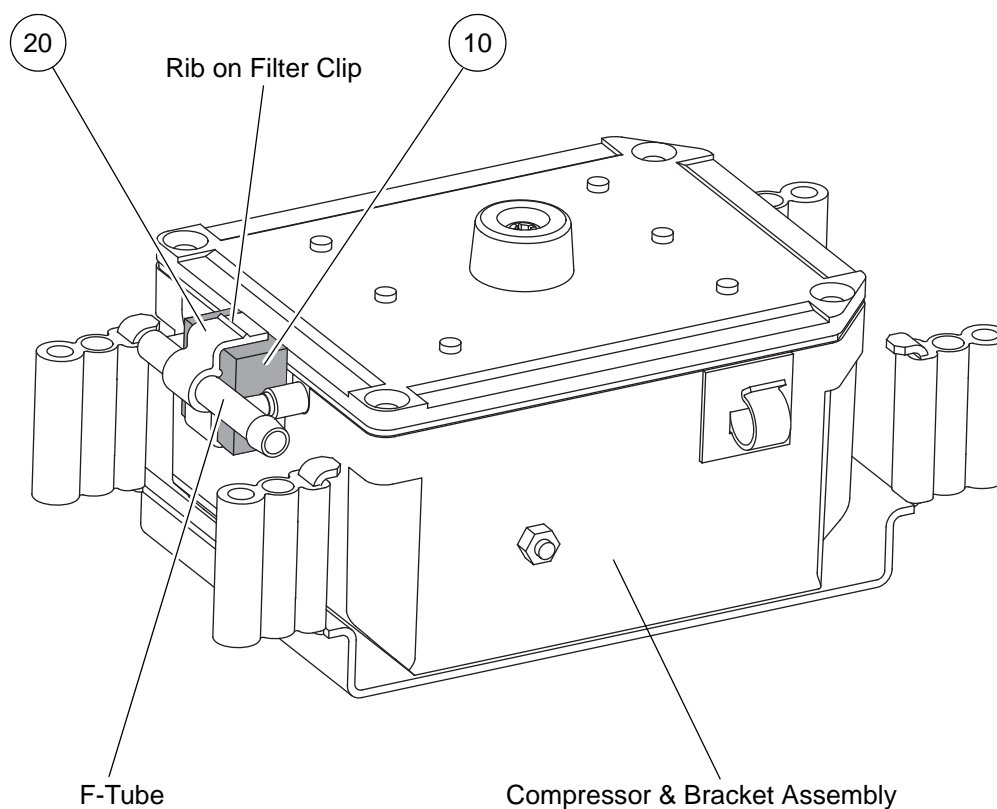
11.2 Remove and discard the filter clip and inlet filter felt (Fig 42, Item 10).

11.3 Place the new inlet filter felt (Fig 42, Item 10) between the F-tube and the compressor.

11.4 Position the new filter clip (Fig 42, Item 20) over the inlet filter felt and F-tube.

**Note:** Make sure the rib is on the top of the filter clip (refer to Figure 42).

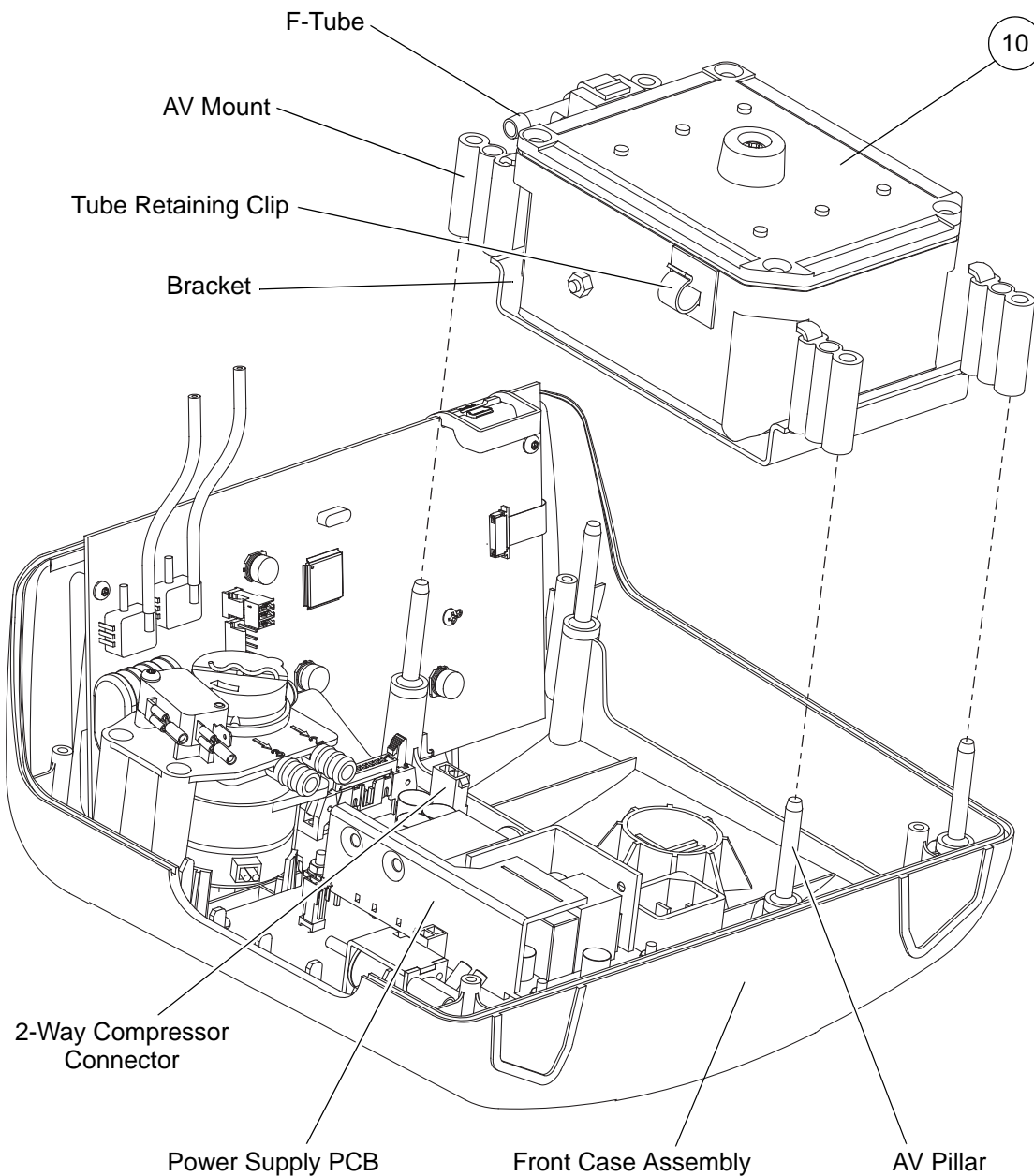
11.5 Push the filter clip until it clicks securely onto the F-tube.



**Figure 42 - Replacing the Inlet Filter Felt on the Compressor Assembly**

**Table 17 - Compressor Inlet Filter Felt Parts List**

Item	Part Number	Description	Qty
10	500417	Filter Felt, Compressor Inlet	1
20	500410	Filter Clip	1



**Note:** Tube assemblies not shown for clarity.

**Figure 43 - Replacing the Compressor & Bracket Assembly**

**Table 18 - Compressor & Bracket Assembly Parts List**

Item	Part Number	Description	Qty
10	464111	Compressor & Bracket Assembly	1

## 12 Removing the Compressor & Bracket Assembly

**Note:** *The compressor & bracket assembly comprises the compressor, metal bracket, AV mounts, filter felt, filter clip, F-tube, bump stops and tube retaining clip; it does not include the AV pillars.*

- 12.1 Remove the rear case assembly from the front case assembly (refer to Page 48, Section 5).
- 12.2 Hold the F-tube on the rear of the compressor & bracket assembly (Fig 43, Item 10) and carefully pull the white tube off the F-tube.
- 12.3 Remove the white tube from the retaining clip on the side of the compressor.
- 12.4 Remove the compressor cable from the 2-way compressor connector on the power supply PCB assembly.
- 12.5 Lift the compressor & bracket assembly, together with the 4 AV mounts, off the 4 AV pillars and out of the front case.

**Note:** *The 4 AV mounts are part of the compressor assembly.*

**Note:** *The compressor assembly is **NOT** serviceable.*

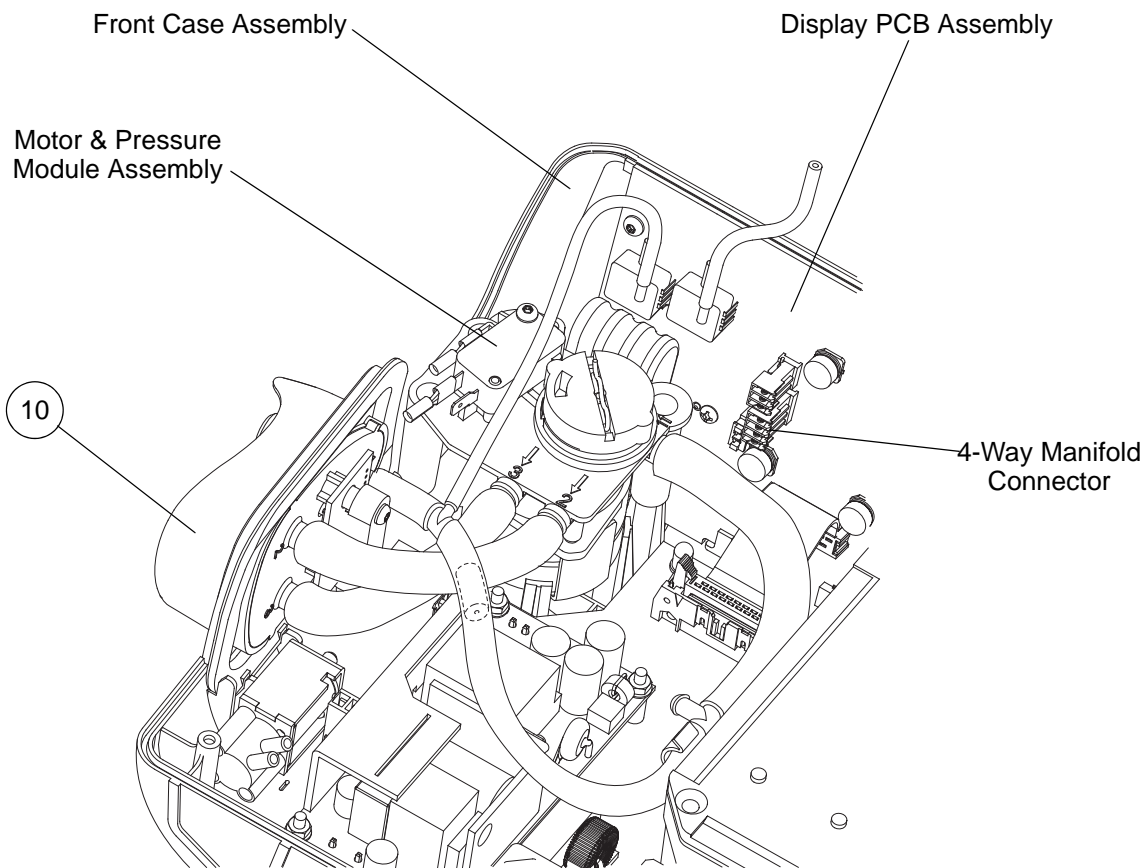
## 13 Installing the Compressor & Bracket Assembly

**Note:** *Refer to Figure 39 for the layout of the tube assemblies.*

- 13.1 Inspect the 4 AV pillars and replace if necessary (refer to Page 52, Section 10).
- 13.2 Position the 4 AV mounts on the new compressor & bracket assembly (Fig 43, Item 10) over the 4 AV pillars in the front case.

**Note:** *Make sure the F-tube and cable on the compressor assembly are adjacent to the display PCB assembly.*
- 13.3 Lower the compressor & bracket assembly down, by pushing the AV mounts onto the AV pillars.
- 13.4 Connect the compressor cable onto the 2-way compressor connector on the power supply PCB assembly.
- 13.5 Attach the white tube to the retaining clip on the side of the compressor, as follows:
  - 13.5.1 Take the tube from the motor & pressure module assembly to the outlet manifold assembly, and push the **WHITE** tube by the T-connector into the retaining clip.
  - 13.5.2 When fitted, the tube assembly and tube clip should be exactly as shown in Figure 39.

**Note:** *Do not put the blue tube by the T-connector into the retaining clip, or the tube assembly could become "kinked" or blocked.*
- 13.6 Hold the F-tube on the rear of the compressor assembly and carefully push the white tube from the bio-filter onto the F-tube.
- 13.7 Install the rear case assembly onto the front case assembly (refer to Page 48, Section 5).

**Figure 44 - Replacing the Outlet Manifold Assembly****Table 19 - Manifold Assembly Parts List**

Item	Part Number	Description	Qty
10	464115	Outlet Manifold Assembly	1



## 14 Removing the Outlet Manifold Assembly

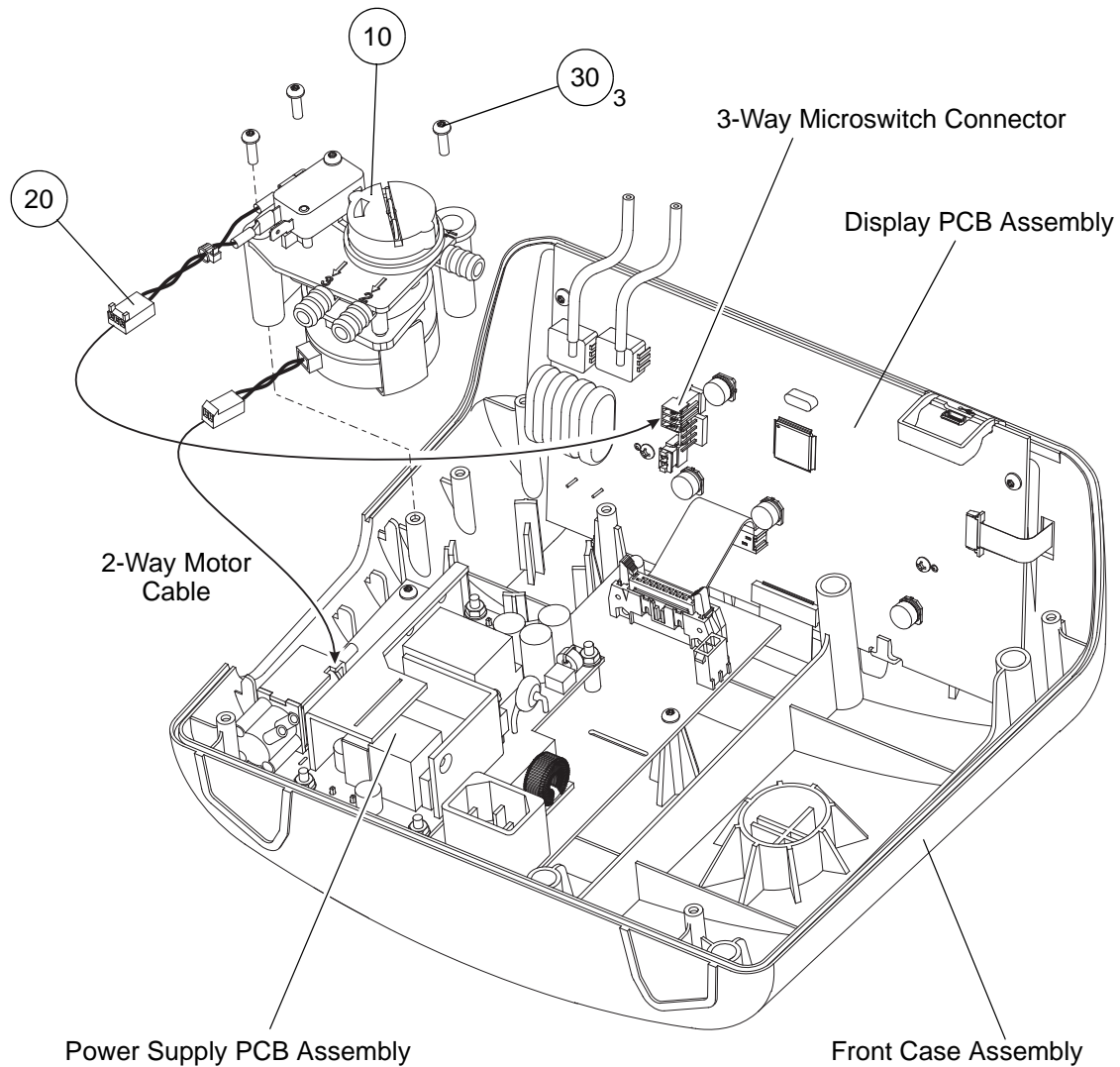
**Note:** *The outlet manifold assembly comprises the O-rings and rear PCB and cable assembly.*

- 14.1 Remove the rear case assembly from the front case assembly (refer to Page 48, Section 5).
- 14.2 Remove the manifold cable from the 4-way manifold connector on the display PCB assembly.
- 14.3 Lift the outlet manifold assembly (Fig 44, Item 10) out of the front case.
- 14.4 Remove the 3 tubes from the back of the outlet manifold assembly.

## 15 Installing the Outlet Manifold Assembly

- 15.1 Position the outlet manifold assembly (Fig 44, Item 10) by the cutout in the front case.
- 15.2 Push the 3 tubes onto the back of the outlet manifold assembly.

**Note:** *Make sure the tubes are connected to the correct ports on the outlet manifold assembly with respect to the outlet tubes on the motor & pressure module assembly (refer to Figure 44).*
- 15.3 Route the manifold cable under the tubes and connect it to the 4-way manifold connector on the display PCB assembly.
- 15.4 Put the outlet manifold assembly into the cutout in the front case.
- 15.5 Install the rear case assembly onto the front case assembly (refer to Page 48, Section 5).



**Note:** Tube assemblies not shown for clarity.

**Figure 45 - Replacing the Motor & Pressure Module Assembly**

**Table 20 - Motor & Pressure Module Assembly Parts List**

Item	Part Number	Description	Qty
10	464110	Motor & Pressure Module Assembly	1
20	464437	Microswitch Cable Assembly	1
30	FAS257	Screw, 3 dia x 10 long, Torx, Pan Head PT	3

## 16 Removing the Motor & Pressure Module Assembly

**Note:** The motor & pressure module assembly comprises the motor, pressure module and microswitch; it does not include the microswitch cable assembly.

- 16.1 Remove the rear case assembly from the front case assembly (refer to Page 48, Section 5).
- 16.2 There are two cables on the motor & pressure module assembly:
  - 16.2.1 Remove the microswitch cable (Fig 45, Item 20) from the microswitch.
  - 16.2.2 Remove the motor cable from the 2-way motor connector on the power supply PCB assembly.
- 16.3 Remove the 3 tubes from the motor & pressure module assembly (Fig 45, Item 10).
- 16.4 Remove the 3 screws (Fig 45, Item 30) and lift the motor & pressure module assembly out of the front case.

## 17 Installing the Motor & Pressure Module Assembly

- 17.1 Put the motor & pressure module assembly (Fig 45, Item 10) into the front case and install the 3 screws (Fig 45, Item 30).
- 17.2 Connect the motor cable to the 2-way motor connector on the power supply PCB assembly.
- 17.3 Connect the microswitch wires (Fig 45, Item 20) to the microswitch on the motor & pressure module assembly (Fig 45, Item 10).

**Note:** Make sure the wires are fitted to the correct microswitch terminals; there is a third unused terminal on the microswitch (refer to Figure 46).

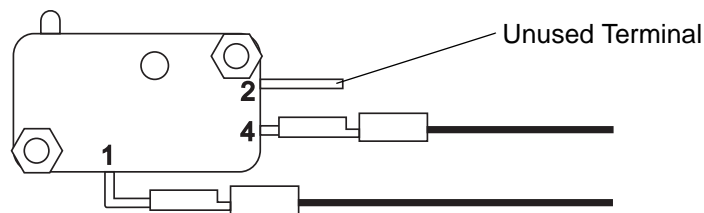
**Note:** The two white wires are interchangeable.

- 17.4 Push the 3 tubes onto the motor & pressure module assembly.

**Note:** Make sure the tubes are connected to the correct ports on the motor & pressure module assembly with respect to the tubes on the outlet manifold assembly (refer to Figure 44).

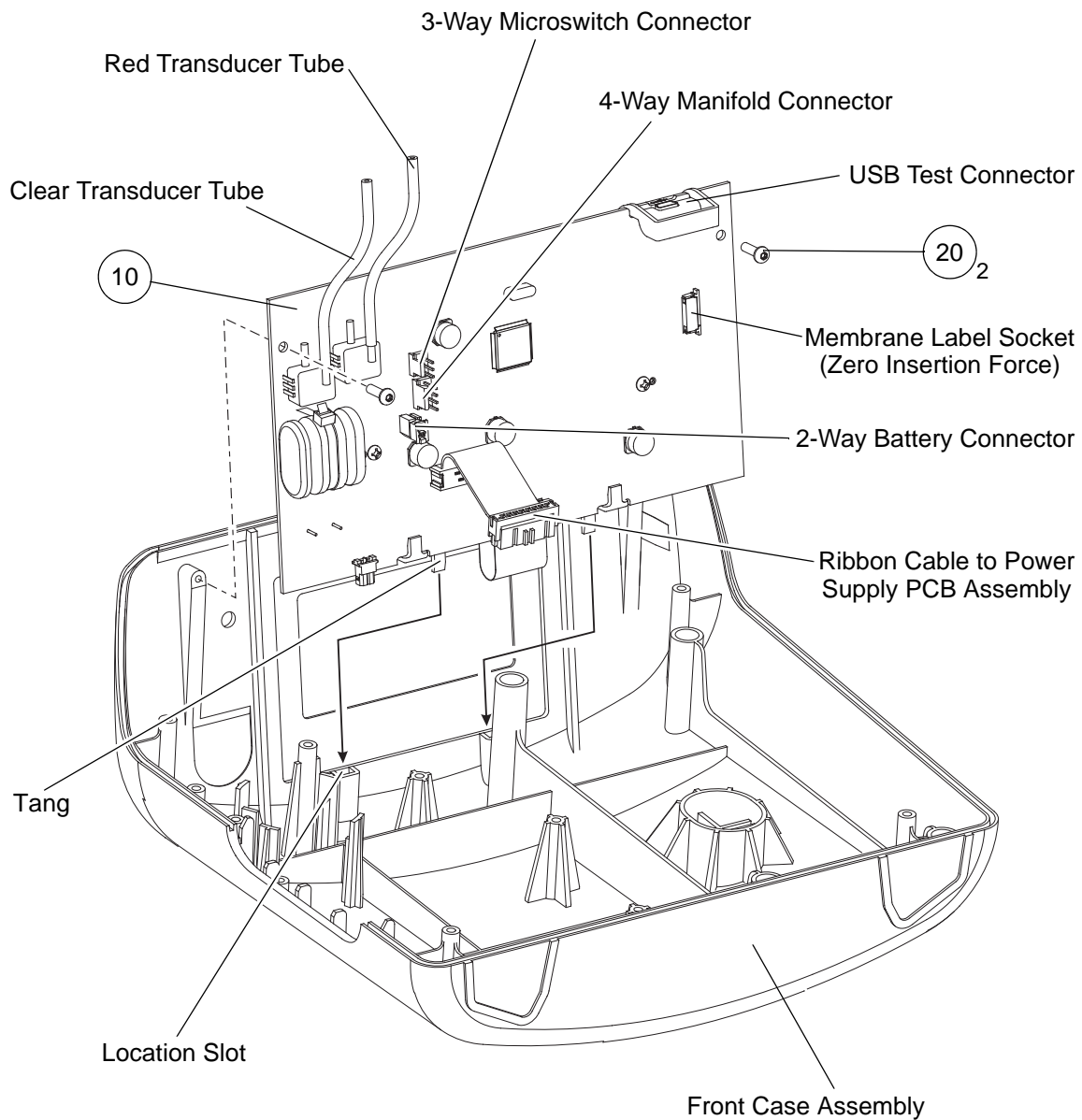
**Note:** Make sure the cables are routed under the tubes.

- 17.5 Install the rear case assembly onto the front case assembly (refer to Page 48, Section 5).



**Note:** 2-way cable is connected to terminals 1 and 4.  
The wires on terminals 1 and 4 are interchangeable.  
Terminal 2 is unused.

**Figure 46 - Electrical Connections to the Microswitch**



**Note: Other assemblies not shown for clarity.**

**Figure 47 - Replacing the Display PCB Assembly and Battery**

**Table 21 - Display PCB Assembly and Battery Parts List**

Item	Part Number	Description	Qty
10	464414	Display PCB Assembly (All variants except USA)	1
-	464414US	Display PCB Assembly (USA Only)	1
20	FAS257	Screw, 3 dia x 10 long, Torx, Pan Head PT	2

## 18 Removing the Display PCB Assembly

**Note:** The display PCB assembly includes the rechargeable battery, the red and clear transducer tubes and then ribbon cable (to connect to the power supply PCB assembly).

- 18.1 Remove the rear case assembly from the front case assembly (refer to Page 48, Section 5).
- 18.2 Remove the microswitch cable from the 3-way microswitch connector on the display PCB assembly (Fig 47, Item 10).
- 18.3 Remove the manifold cable from the 4-way manifold connector on the display PCB assembly.
- 18.4 Disconnect the ribbon cable (which connects the display PCB assembly to the power supply PCB assembly) from the socket on the power supply PCB assembly.

**Note:** There are two ejector/retention handles on the socket on the power supply PCB assembly. Push the handles apart to eject the ribbon cable.

- 18.5 Remove the red and clear transducer tubes from the two T-connectors on the tube assemblies (refer to Figure 49).

**CAUTION:** The transducers on the display PCB assembly are sensitive. Do not pull the tubes off the transducers.

### Disconnecting the Membrane Label from the Display PCB Assembly

- 18.6 Carefully remove the membrane label "tail" from the socket on the display PCB assembly (below the USB test connector), as follows:

**CAUTION:** Do NOT attempt to pull the membrane label "tail" out of the socket on the display PCB assembly, or you could damage the connections on the "tail". This is a "ZIF" (zero insertion force) socket, which must be "unlocked" before the "tail" can be removed.

- 18.6.1 Using a small tool which will not damage the ZIF socket, gently push the outer edges of the locking plate away from the connector body on the ZIF socket, until the locking plate is in the fully open position (fully extended); the membrane label "tail" is now released (refer to Figure 48).

**Note:** The total travel of the locking plate is less than 2mm.

- 18.6.2 Remove the membrane label "tail" from the ZIF socket.
- 18.7 Remove the two screws (Fig 47, Item 20) and lift the display PCB assembly out of the front case.

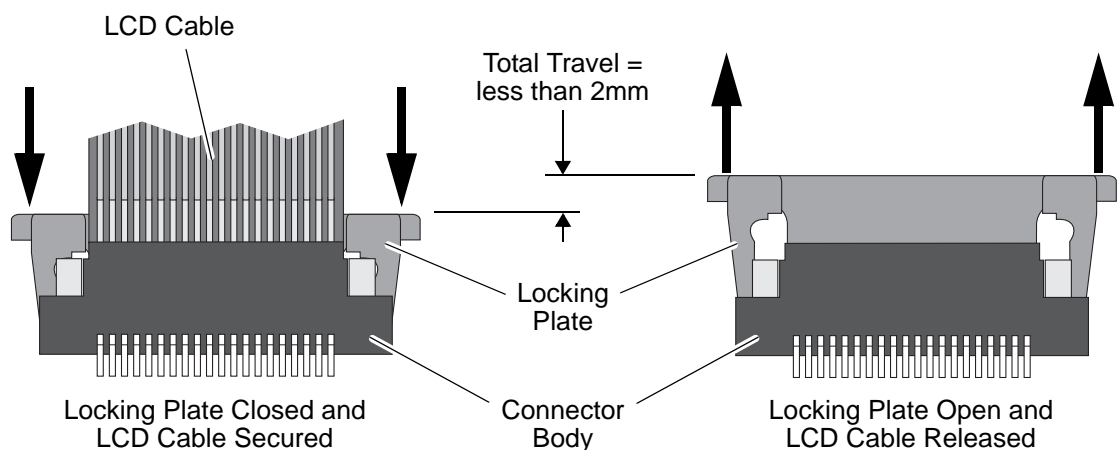


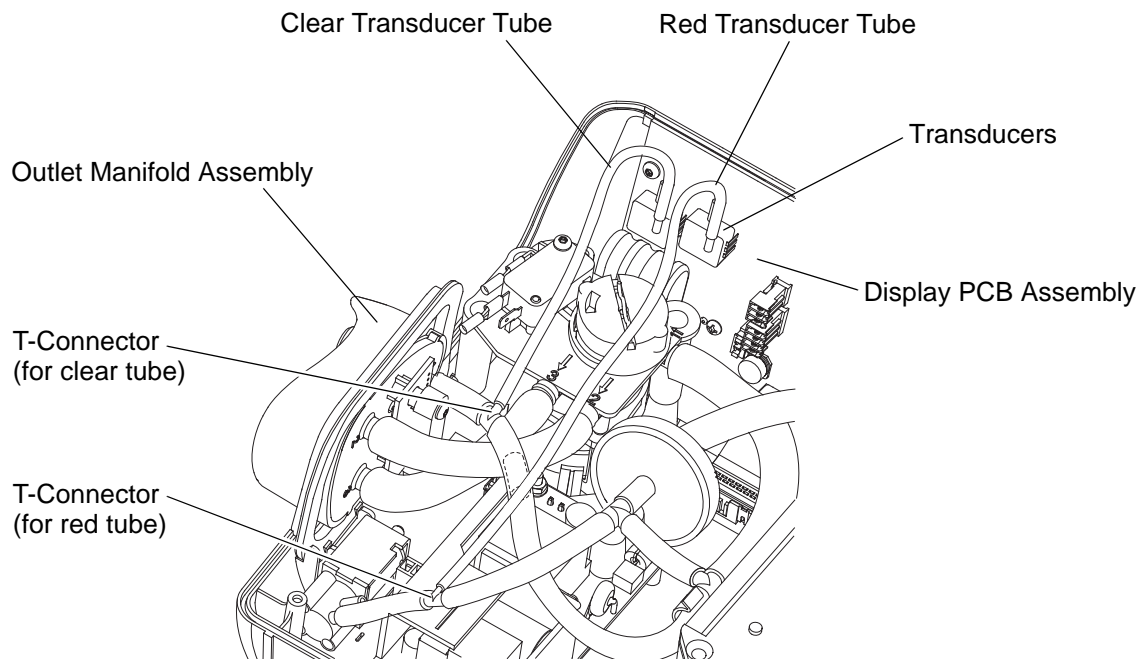
Figure 48 - ZIF (Zero Insertion Force) Socket

## 19 Installing the Display PCB Assembly

- 19.1 Turn the display PCB assembly (Fig 47, Item 10) over so that the LCD screen is on top, and:
  - 19.1.1 Make sure that the single LED is perpendicular to the board.
  - 19.1.2 Remove the protective film from the LCD screen.
- 19.2 Locate the two tangs in the bottom of the display PCB assembly into the corresponding location slots in the front case.
- 19.3 Install the two screws (Fig 47, Item 20) to secure the display PCB assembly.
- 19.4 Connect the ribbon cable (which connects the display PCB assembly to the power supply PCB assembly) to the socket on the power supply PCB assembly.

**Note:** *There are two ejector/retention handles on the socket on the power supply PCB assembly. As you push the ribbon cable into the socket, the handles close over the ribbon cable connector to retain it.*
- 19.5 Connect the manifold cable to the 4-way manifold connector on the display PCB assembly.
- 19.6 Connect the microswitch cable to the 3-way microswitch connector on the display PCB assembly.
- 19.7 Push the red and clear transducer tubes onto the T-connectors on the tube assemblies (refer to Figure 49).

**CAUTION:** *The transducers on the display PCB assembly are sensitive. Do not handle the transducers unnecessarily.*



**Figure 49 - Connection of Clear and Red Transducer Tubes**

**Connecting the Membrane Label to the Display PCB Assembly**

- 19.8 Carefully insert the membrane label “tail” into the connector on the display PCB assembly (below the USB test connector), as follows:

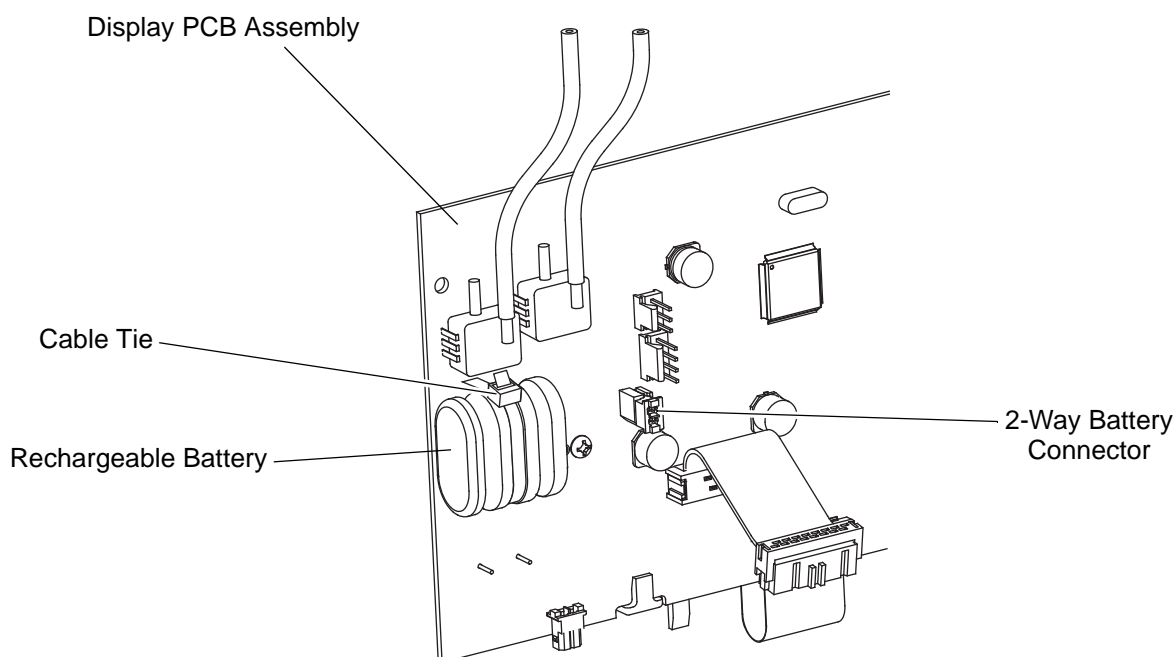
**CAUTION:** *Do NOT attempt to push the membrane label “tail” into the socket on the display PCB assembly, or you could damage the connections on the “tail”. This is a “ZIF” (zero insertion force) socket, which must be “unlocked” before the “tail” can be inserted.*

- 19.8.1 Make sure the locking plate on the ZIF socket is in the fully open position (fully extended). If not, use a small tool which will not damage the ZIF socket to push the outer edges of the locking plate away from the connector body on the ZIF socket, until the locking plate is in the fully open position (refer to Figure 48).
- 19.8.2 Fully insert the end of the membrane label “tail” into the slot in the ZIF socket.  
**Note:** *Less than 3mm of the “tail” can be inserted into the ZIF socket.*  
**Note:** *Make sure the end of the “tail” is centrally and evenly inserted into the connector or the pump may malfunction.*
- 19.8.3 Without moving the “tail” in the ZIF socket, use the small tool to gently push the outer edges of the locking plate into the connector body on the ZIF socket, until the locking plate is in the closed position (fully retracted).
- 19.8.4 The LCD cable is now secured in the ZIF connector.
- 19.9 Install the rear case assembly onto the front case assembly (refer to Page 48, Section 5).

## 20 Replacing the Rechargeable Battery

**Note:** The replacement battery kit comprises the rechargeable battery, adhesive pad and cable tie.

- 20.1 Refer to Figure 50 when carrying out this procedure.
- 20.2 Remove the display PCB assembly from the front case (refer to Page 61, Section 18).
- 20.3 Remove the battery cable from the 2-way battery connector on the display PCB assembly.
- 20.4 Cut the cable tie which secures the rechargeable battery to the display PCB assembly.
- 20.5 Remove the battery from the adhesive pad which is stuck between the battery and the display PCB assembly.
- 20.6 Make sure all of the old adhesive pad is removed from the display PCB assembly.
- 20.7 Remove the rechargeable battery, adhesive pad and cable tie from the replacement battery kit (Fig 50, Item 10).
- 20.8 Secure the new battery to the display PCB assembly using the new adhesive pad.  
**Note:** Make sure the battery is within the silk screen marking on the PCB assembly.
- 20.9 Fit the new cable tie around the battery and through the holes in the PCB assembly.
- 20.10 Connect the battery cable to the 2-way battery connector on the display PCB assembly.
- 20.11 Install the display PCB assembly into the front case (refer to Page 62, Section 19).



**Figure 50 - Replacing the Rechargeable Battery**

**Table 22 - Replacement Battery Kit Parts List**

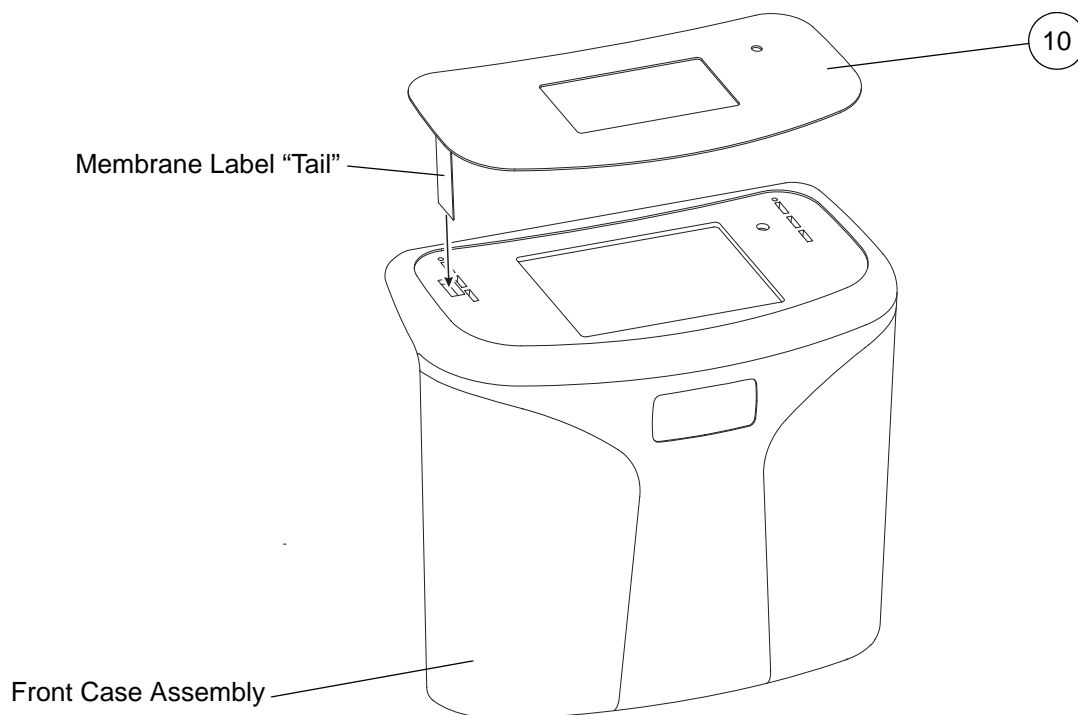
Item	Part Number	Description	Qty
10	464600	Replacement Battery Kit (comprising rechargeable battery, adhesive pad and cable tie)	1



## 21 Replacing the Display Membrane Label

**Note:** The display membrane label can be replaced without removing the display PCB assembly.

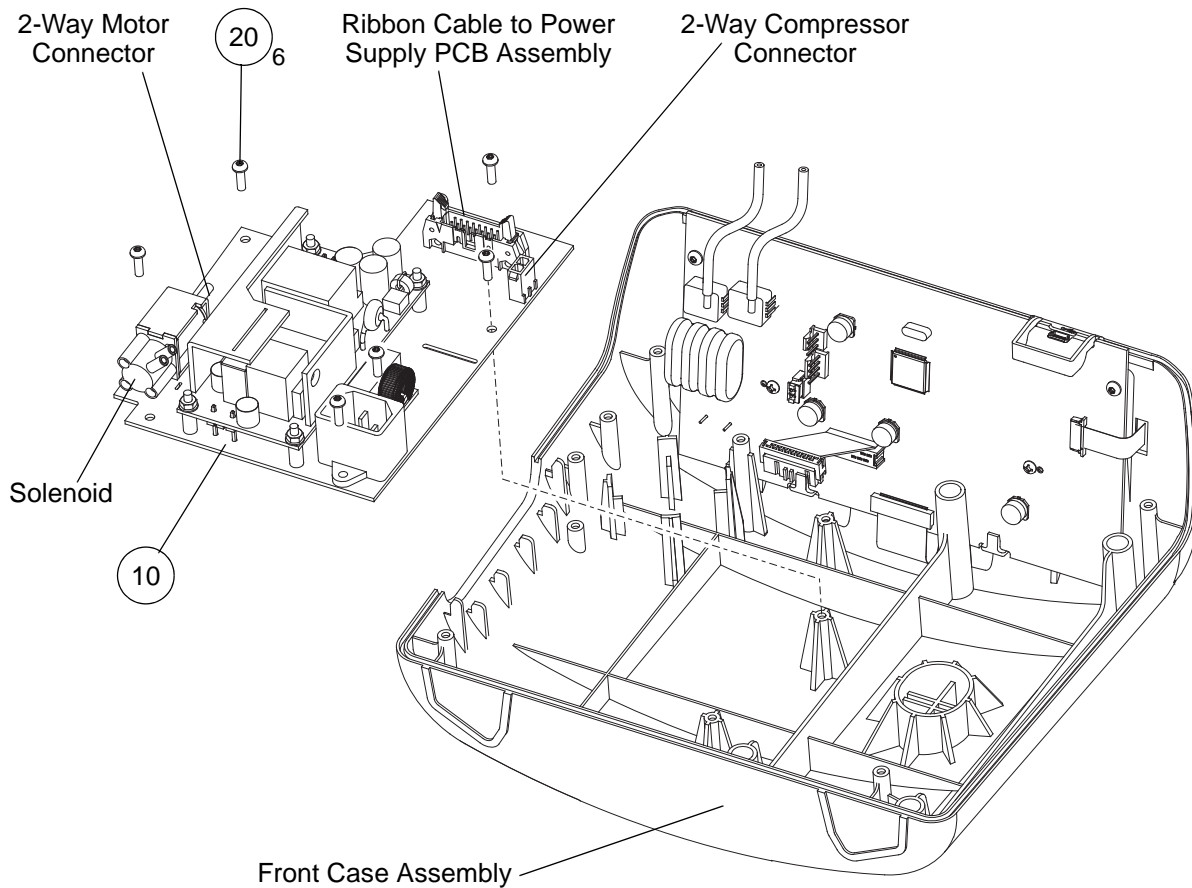
- 21.1 Remove the rear case assembly from the front case assembly (refer to Page 48, Section 5).
  - 21.2 Carefully remove the membrane label "tail" from the socket on the display PCB assembly (refer to Page 61, "Disconnecting the Membrane Label from the Display PCB Assembly").
  - 21.3 Remove the old display membrane label (Fig 51, Item 10) from the front case.
  - 21.4 Make sure all adhesive residue is removed from the front case moulding.
  - 21.5 Make sure that the LCD screen on the display PCB assembly is not dusty or contaminated; clean the LCD screen if necessary.
  - 21.6 Remove the protective film from the rear of the new display membrane label (Fig 51, Item 10).
- Note:** Do not remove the protective film from the front of the membrane label.
- 21.7 Remove the backing paper from the back of the display membrane label.
  - 21.8 Put the membrane label "tail" through the slot in the top of the front case.
- Note:** Do not bend or crease the "tail".
- 21.9 Align the membrane label to the front case, and push down firmly to secure.
  - 21.10 Carefully insert the membrane label "tail" into the connector on the display PCB assembly (refer to Page 63, "Connecting the Membrane Label to the Display PCB Assembly").
  - 21.11 Install the rear case assembly onto the front case assembly (refer to Page 48, Section 5).



**Figure 51 - Replacing the Display Membrane Label**

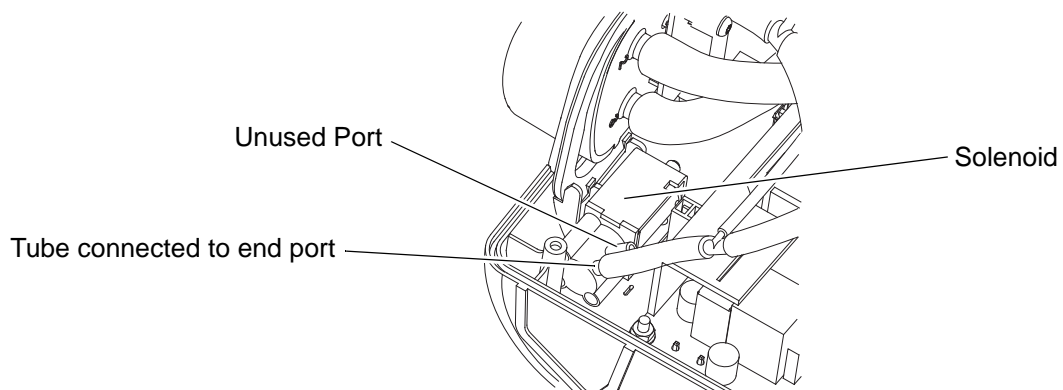
**Table 23 - Display Membrane Label Parts List**

Item	Part Number	Description	Qty
10	464421	Display Membrane Label	1



**Note:** Other assemblies not shown for clarity.

**Figure 52 - Replacing the Power Supply PCB Assembly**



**Figure 53 - Connection of Tube to Solenoid**

**Table 24 - Power Supply PCB Assembly Parts List**

Item	Part Number	Description	Qty
10	464416	Power Supply PCB Assembly	1
20	FAS257	Screw, 3 dia x 10 long, Torx, Pan Head PT	6

## 22 Removing the Power Supply PCB Assembly

**Note:** *The power supply PCB assembly can be removed from the front case assembly without removing any other sub-assemblies.*

- 22.1 Remove the rear case assembly from the front case assembly (refer to Page 48, Section 5).
- 22.2 Remove the tube from the end port on the solenoid on the power supply PCB assembly (Fig 52, Item 10).
- 22.3 Remove the compressor cable from the 2-way compressor connector on the power supply PCB assembly.
- 22.4 Remove the motor cable from the 2-way motor connector on the power supply PCB assembly.
- 22.5 Disconnect the ribbon cable (which connects the display PCB assembly to the power supply PCB assembly) from the socket on the power supply PCB assembly.

**Note:** *There are two ejector/retention handles on the socket on the power supply PCB assembly. Push the handles apart to eject the ribbon cable.*

- 22.6 Remove the 6 screws (Fig 52, Item 20) and lift the power supply PCB assembly out of the front case.

**Note:** *You may have to move tube assemblies and cables out of the way.*

## 23 Installing the Power Supply PCB Assembly

- 23.1 Put the power supply PCB assembly (Fig 52, Item 10) into the front case.

**Note:** *You may have to move tube assemblies and cables out of the way.*

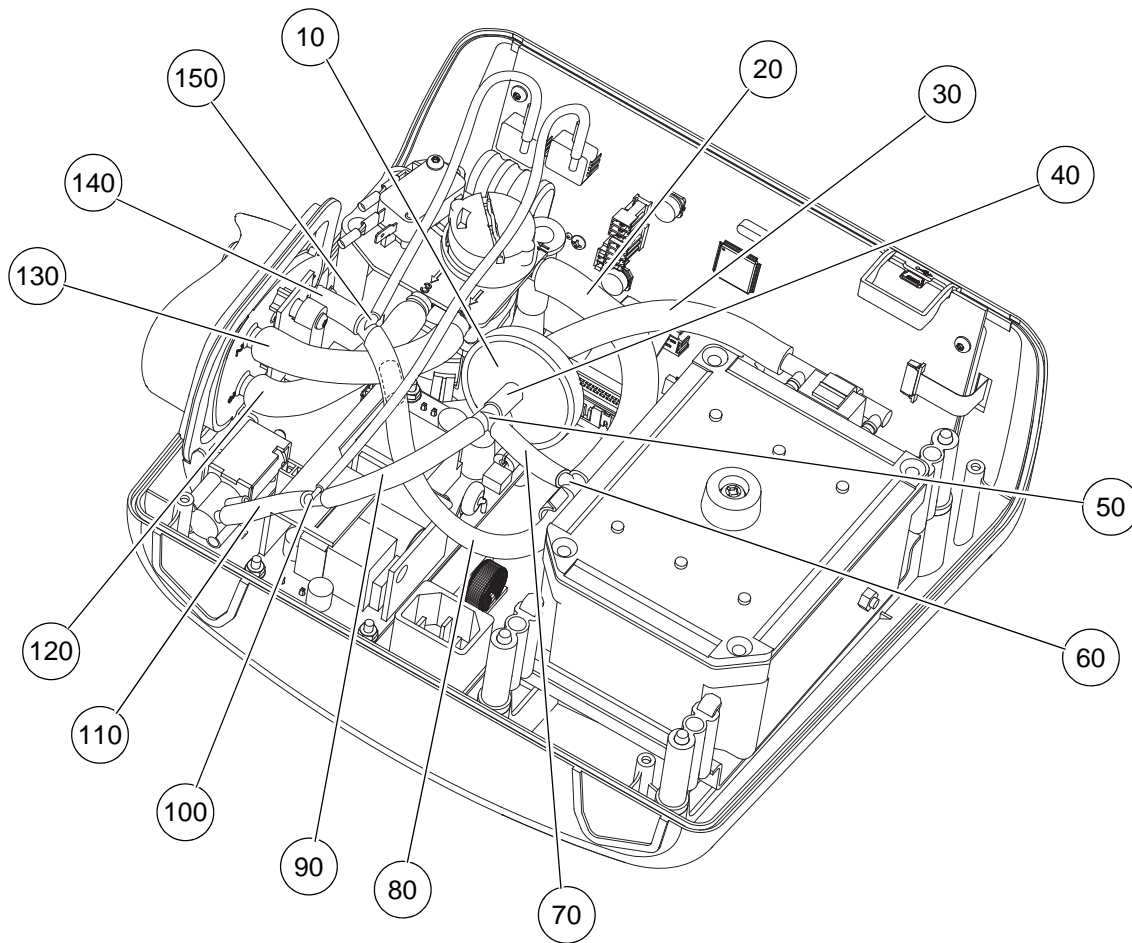
- 23.2 Install the 6 screws (Fig 52, Item 20) to secure the power supply PCB assembly.
- 23.3 Connect the ribbon cable (which connects the display PCB assembly to the power supply PCB assembly) to the socket on the power supply PCB assembly.

**Note:** *There are two ejector/retention handles on the socket on the power supply PCB assembly. As you push the ribbon cable into the socket, the handles close over the ribbon cable connector to retain it.*

- 23.4 Connect the motor cable to the 2-way motor connector on the power supply PCB assembly.
- 23.5 Connect the compressor cable to the 2-way compressor connector on the power supply PCB assembly.
- 23.6 Push the clear tube on the tube assembly onto the end port on the solenoid on the power supply PCB assembly (refer to Figure 53).

**Note:** *Make sure it is connected to the correct port on the solenoid. The other port on the solenoid is unused.*

- 23.7 Install the rear case assembly onto the front case assembly (refer to Page 48, Section 5).



**Figure 54 - Bio-Filter, Tubes and Connectors in the Pump**

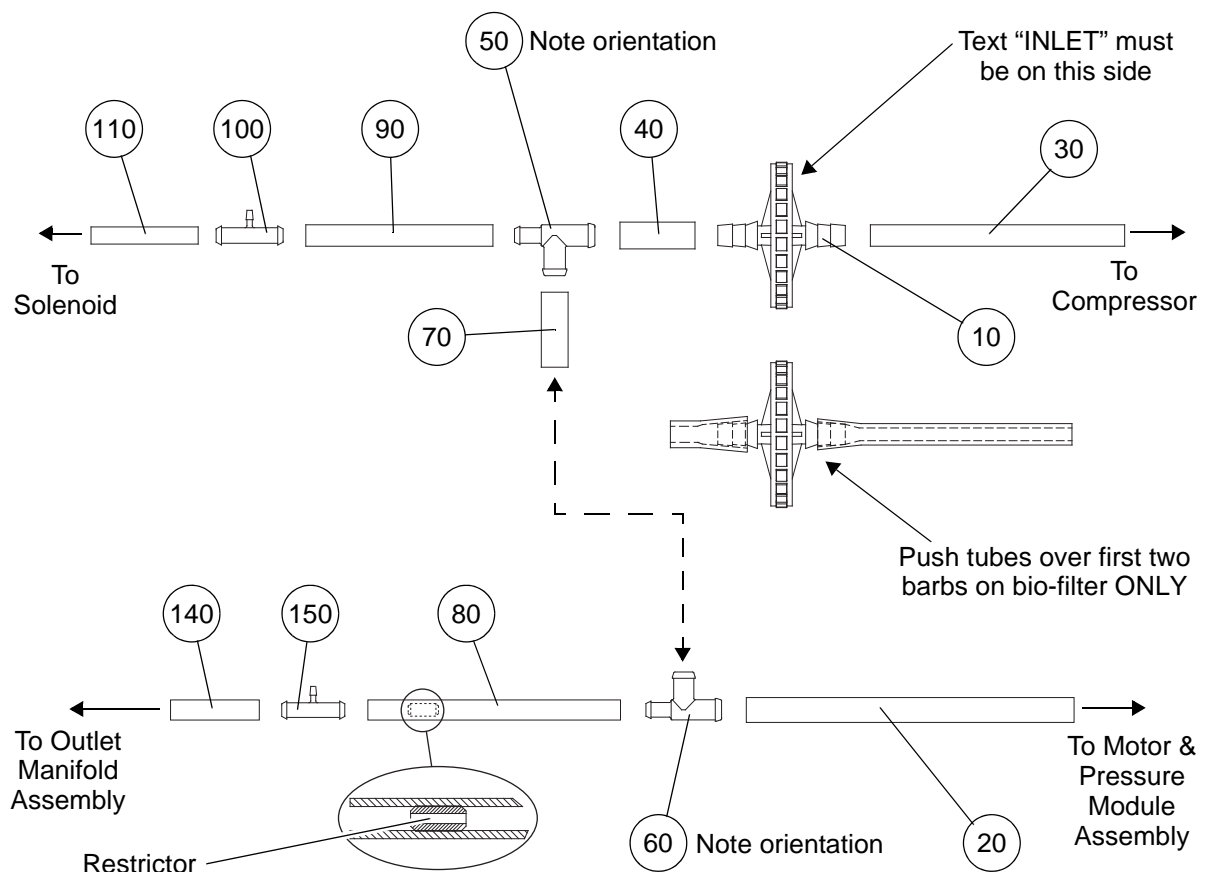
**Table 25 - Bio-Filter, Tubes and Connectors Parts List**

Item	Part Number	Description	Cut Length (mm)	Qty
10	630454	Bio-Filter	-	1
20	SW393	Tube, Blue Silicone Rubber, 6mm ID 10mm OD	130 ± 2	1
30	PAC162	Tube, White Silicone Rubber, 3/16" ID 5/16" OD	95 ± 2	1
40	SW393	Tube, Blue Silicone Rubber, 6mm ID 10mm OD	28 ± 1	1
50	464455	T-Connector, Reducer	-	1
60	464455	T-Connector, Reducer	-	1
70	SW393	Tube, Blue Silicone Rubber, 6mm ID 10mm OD	28 ± 1	1
80	464116	Restrictor Tube Assembly	-	1
90	PAC162	Tube, White Silicone Rubber, 3/16" ID 5/16" OD	70 ± 2	1
100	464442	T-Connector, Microbore	-	1
110	464439	Tube, Clear Silicone Rubber	40 ± 1	1
120	SW393	Tube, Blue Silicone Rubber, 6mm ID 10mm OD	80 ± 2	1
130	SW393	Tube, Blue Silicone Rubber, 6mm ID 10mm OD	90 ± 2	1
140	PAC162	Tube, White Silicone Rubber, 3/16" ID 5/16" OD	70 ± 2	1
150	464442	T-Connector, Microbore	-	1

## 24 Replacing the Bio-Filter, Tubes and Connectors

- 24.1 Refer to Figures 54 and 55 for the positions and orientations of the bio-filter, tubes and connectors inside the pump.
- 24.2 All tubes, except the restrictor tube (Fig 54, Item 80; Fig 55, Item 80) and the red and clear transducer tubes (refer to Figure 49), are cut from a reel of the appropriate tube, as follows:
- 24.2.1 SW393: Tube, Blue Silicone Rubber, 6mm ID 10mm OD.
  - 24.2.2 PAC162: Tube, White Silicone Rubber, 3/16" ID 5/16" OD.
  - 24.2.3 464439: Tube, Clear Silicone Rubber.
  - 24.2.4 Table 25 specifies the cut length of the tube, with a tolerance.
- 24.3 The restrictor tube assembly (Fig 54, Item 80; Fig 55, Item 80) is a replacement sub-assembly, with a pre-cut tube and the brass restrictor already installed.
- 24.4 Make sure that all tubes are pushed over the barbs and up to the shoulders of all connectors.
- 24.5 When replacing the bio-filter (Fig 54, Item 10; Fig 55, Item 10), or tubes connected to it (Fig 54, Items 30 and 40; Fig 55, Items 30 and 40), do not push the tubes up to the shoulders of the bio-filter; push the tubes over the first two barbs on the bio-filter ONLY.
- 24.6 When replacing the bio-filter (Fig 54, Item 10; Fig 55, Item 10), make sure that the text "INLET" (on one side of the bio-filter) is facing the compressor.

**Note:** The red and clear transducer tubes (refer to Figure 49) are part of the display PCB assembly.



**Note orientation of bio-filter item 10 and connectors items 50 and 60**

**Figure 55 - Bio-Filter, Tubes and Connectors - Exploded View**

## 25 Replacing the Front Case Moulding

- 25.1 Remove the rear case assembly from the front case assembly (refer to Page 48, Section 5).
- 25.2 Remove the following sub-assemblies from the front case:
- 25.2.1 The compressor & bracket assembly (refer to Page 55, Section 12).
  - 25.2.2 The outlet manifold assembly (refer to Page 57, Section 14).
  - 25.2.3 The motor & manifold assembly (refer to Page 59, Section 16).
  - 25.2.4 The display PCB assembly (refer to Page 61, Section 18).
  - 25.2.5 The power supply PCB assembly (refer to Page 67, Section 22).
  - 25.2.6 The 4 AV mounts (refer to Page 51, Section 8).
  - 25.2.7 The display membrane label (refer to Page 65, Section 21).
- Note:** Tubes can be removed or left in place, as required.
- 25.3 Replace the front case moulding (Table 26, Item 10).
- 25.4 Fix the following items to the new front case moulding:
- 25.4.1 Install 4 AV pillars (Table 26, Item 20), refer to Page 52, Section 10.  
**Note:** These can be removed from the old front case moulding; make sure they are not damaged.
  - 25.4.2 Fix two rubber feet to the base of the front case moulding (Table 26, Item 30), refer to Page 48, Section 5.
  - 25.4.3 Fix the domed badge to the outside of the front case moulding (Table 26, Item 40).
- 25.5 Install the following sub-assemblies into the front case moulding:
- 25.5.1 The display membrane label (refer to Page 65, Section 21).
  - 25.5.2 The 4 AV mounts (refer to Page 51, Section 9).
  - 25.5.3 The power supply PCB assembly (refer to Page 67, Section 23).
  - 25.5.4 The display PCB assembly (refer to Page 62, Section 19).
  - 25.5.5 The motor & manifold assembly (refer to Page 59, Section 17).
  - 25.5.6 The outlet manifold assembly (refer to Page 57, Section 15).
  - 25.5.7 The compressor & bracket assembly (refer to Page 55, Section 13).
- 25.6 Make sure all cables and tubes are correctly installed.
- 25.7 Install the rear case assembly onto the front case assembly (refer to Page 48, Section 5).

**Table 26 - Front Case Parts List**

Item	Part Number	Description	Qty
10	464400	Front Case Moulding	1
20	464425	AV Pillar	4
30	507413	Rubber Foot	2
40	PKG830	ArjoHuntleigh Domed Badge	1

## 26 Replacing the Rear Case Assembly

**Note:** *The rear case assembly includes the filter felt and cover, bed hooks and covers, carry handle insert and internal filter foams; it does not include the rear or serial number labels, USB cover and mains power cable and cable cover.*

26.1 Remove the rear case assembly from the front case assembly (refer to Page 48, Section 5).

26.2 Replace the rear case assembly (Table 27, Item 10).

26.3 Install the following items to the new rear case assembly (refer to Page 47, Section 4):

**Note:** *These items (and fixing screws) can be removed from the old rear case assembly; make sure they are not damaged.*

26.3.1 Install the mains power cable (Table 27, Item 20) and cable cover (Table 27, Item 30).

26.3.2 Install the USB cover (Table 27, Item 40).

26.3.3 Fix the labels (Table 27, Item 50 and Table 27, Item 60).

26.4 Install the rear case assembly onto the front case assembly (refer to Page 48, Section 5).

**Table 27 - Rear Case Parts List**

Item	Part Number	Description	Qty
10	464108	Rear Case Assembly	1
20	CAB305	Mains Power Cable, IEC, UK	1
-	CAB303	Mains Power Cable, IEC, Euro	1
-	CAB306	Mains Power Cable, IEC, USA	1
-	CAB302	Mains Power Cable, Short, Male IEC to Female IEC	1
30	464402	IEC Cable Cover	1
40	464417	USB Cover	1
50	LAB405	Rear Label	1
60	REF	Serial Number Label	1





## CHAPTER 6

### MATTRESS REPLACEMENT & OVERLAY REPAIR

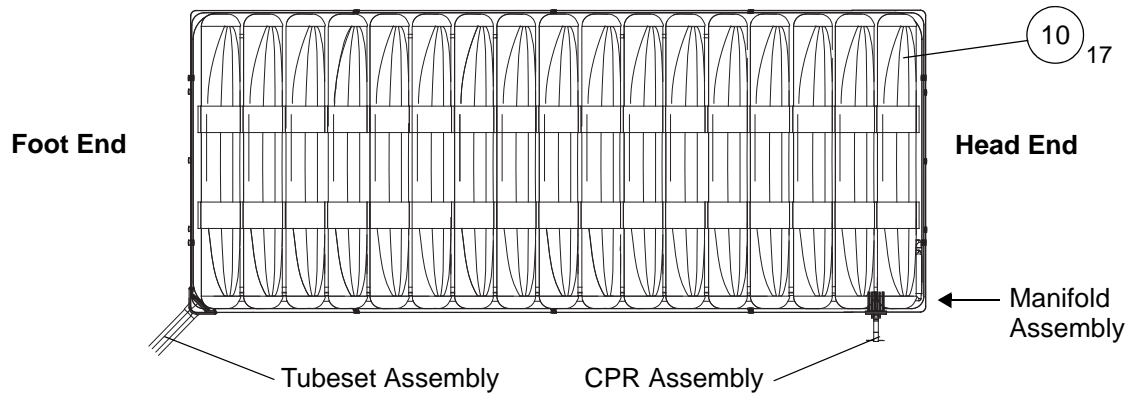
**WARNING: BEFORE PERFORMING ANY REPAIR PROCEDURES, MAKE SURE THAT THE MATTRESS REPLACEMENT OR MATTRESS OVERLAY HAS BEEN ADEQUATELY DECONTAMINATED.**

#### 1 General

This chapter details repair procedures for the **Alpha RESPONSE** mattress replacement (MR) and mattress overlay (OL). All repairs should be carried out by Huntleigh approved service personnel.

- 1.1 To carry out the repair procedures, fully deflate the mattress first, as follows:
  - 1.1.1 Disconnect the tubeset between the mattress and the pump.
  - 1.1.2 Operate the CPR (Cardio-Pulmonary Resuscitation) unit to deflate the mattress.
- 1.2 Throughout this procedure, to facilitate the insertion of connectors into grommets, apply a suitable lubricant, e.g. alcohol wipes, to each surface. This is particularly important when installing the CPR box assembly to the B-pad assembly on the mattress replacement where the grommets are very tight.

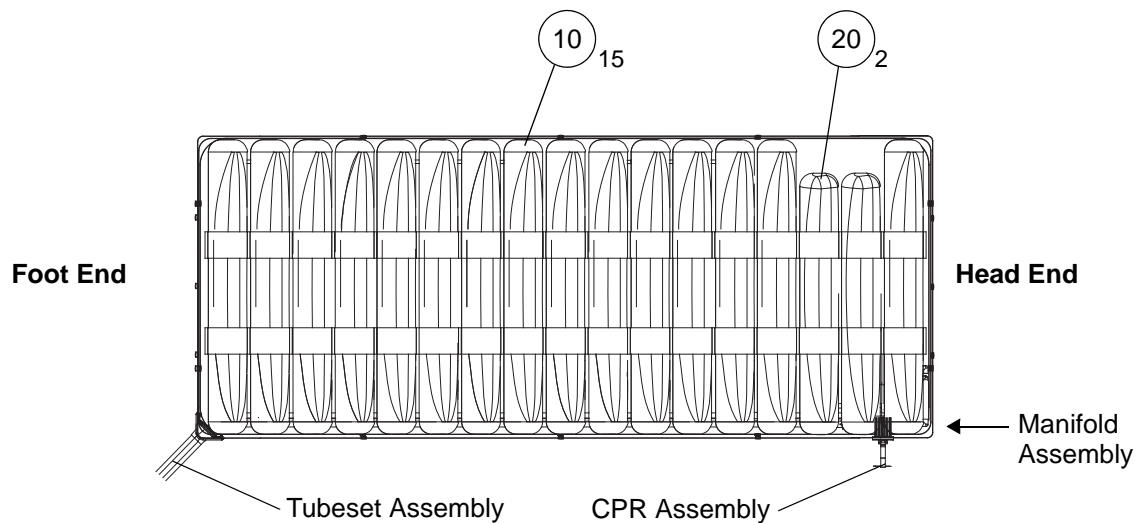
**Note:** Do not use soap as a lubricant.
- 1.3 After carrying out a service or any repairs, the mattress must be tested for serviceability. Carry out an inflation test on the mattress in accordance with Chapter 4 "Testing", Page 43, Section 11.



**Figure 56 - Cell Layout - Mattress Replacement (All) and Mattress Overlay (USA)**

**Table 28 - Mattress Replacement (All) and Mattress Overlay (USA) - Cell Assembly Parts List**

Item	Part Number	Description	Qty
10	AR2M060	Cell Assembly, Standard Mattress	17
-	464260	Cell Assembly, Narrow Mattress	17



**Figure 57 - Cell Layout - Mattress Overlay (All Except USA)**

**Table 29 - Mattress Overlay (All Except USA) - Cell Assembly Parts List**

Item	Part Number	Description	Qty
10	AR2M060	Cell Assembly, Standard Mattress	15
-	464260	Cell Assembly, Narrow Mattress	15
20	464077	Short Cell Assembly, Standard Mattress	2
-	464264	Short Cell Assembly, Narrow Mattress	2

## 2 Replacing the Top Cover Assembly

- 2.1 The zipped top cover part numbers are detailed in Table 30.
- 2.2 Make sure the **Alpha RESPONSE** logo is at the foot end of the mattress.
- 2.3 Before zipping up the top cover assembly, make sure all cell assemblies are securely fitted.

**Note:** Make sure that the tops of all the cell assemblies are angled towards the head end of the mattress.

## 3 Removing a Cell Assembly

- 3.1 Remove the top cover assembly (refer to Page 75, Section 2).
- 3.2 Disconnect the single stud at each end of the cell assembly (Fig 56, Item 10, Fig 57, Items 10 and 20) from the loop sheet assembly.
- 3.3 On the side of the mattress where the manifold is situated, pull the cell grommet off the manifold connector on the underside of the cell assembly.
- 3.4 Withdraw the cell assembly through the two loops in the loop sheet assembly.

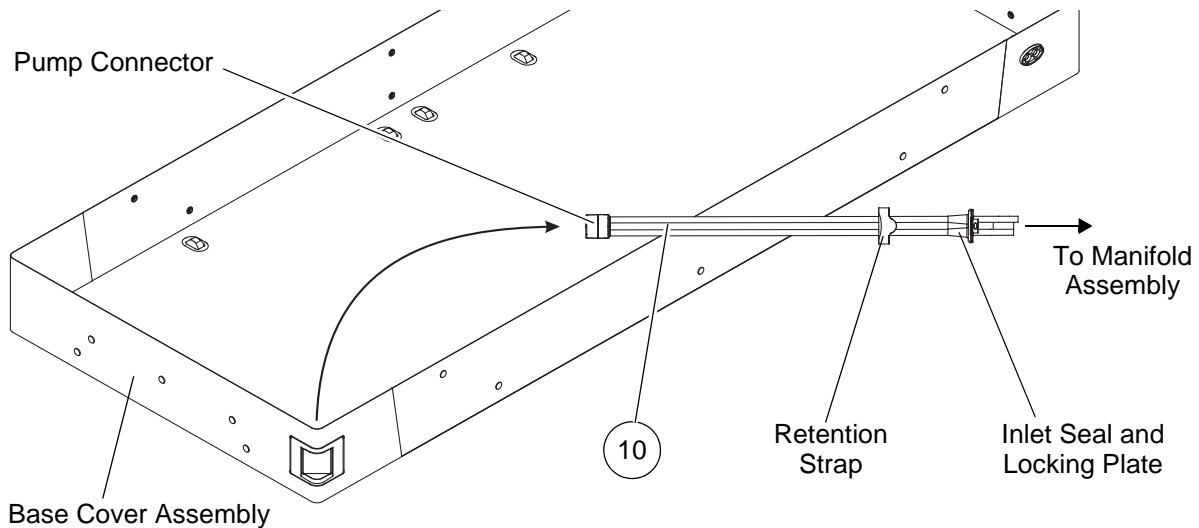
## 4 Installing a Cell Assembly

- 4.1 Make sure the replacement cell assembly (Fig 56, Item 10, Fig 57, Items 10 and 20) is the correct one for the position and type of mattress assembly. The individual cell assemblies are detailed in:
    - 4.1.1 For mattress replacement (all countries) and mattress overlay (USA only), refer to Figure 56 and Table 28.
    - 4.1.2 For mattress overlay (all countries except USA), refer to Figure 57 and Table 29.
  - 4.2 Pass the cell assembly through the two loops in the loop sheet assembly.
 

**Note:** Make sure the grommet on the cell assembly is on the same side as the manifold, and on the underside of the cell assembly.
  - 4.3 On the side of the mattress where the manifold is situated, push the manifold connector into the cell grommet on the underside of the cell assembly.
  - 4.4 Secure both ends of the cell assembly to the loop sheet assembly using the studs.
- Note:** Make sure that the top of the cell assembly is angled towards the head end of the mattress.
- 4.5 Install the top cover assembly (refer to Page 75, Section 2).

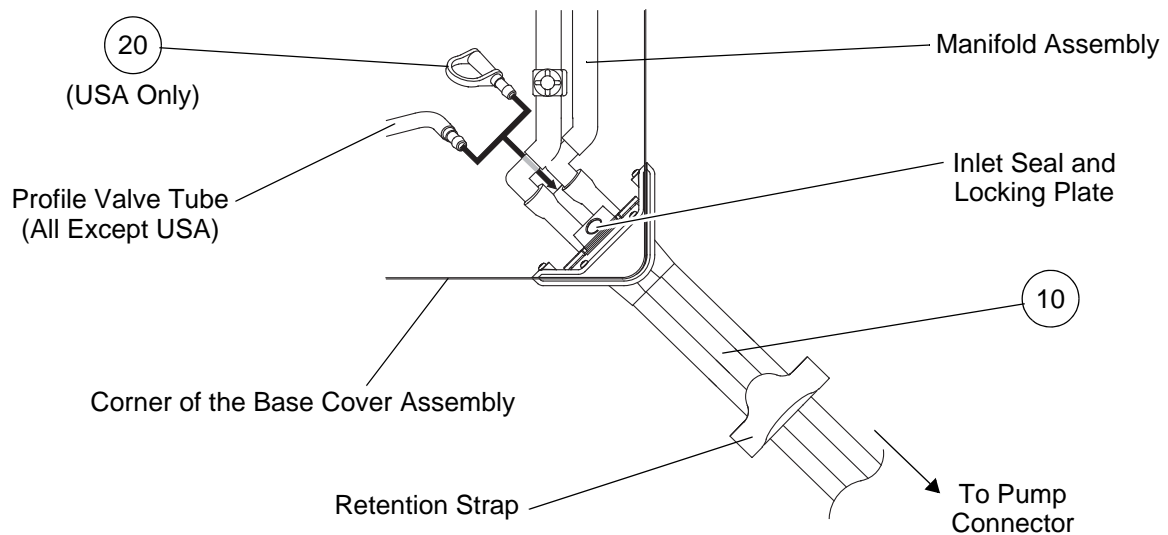
Table 30 - Top Cover Assembly Parts List

Item	Part Number	Description	Qty
10	464080	Top Cover Assembly, Standard Mattress, Advantex	1
20	464082	Top Cover Assembly, Standard Mattress, Dartex	1
30	464280	Top Cover Assembly, Narrow Mattress, Advantex	1
40	464282	Top Cover Assembly, Narrow Mattress, Dartex	1

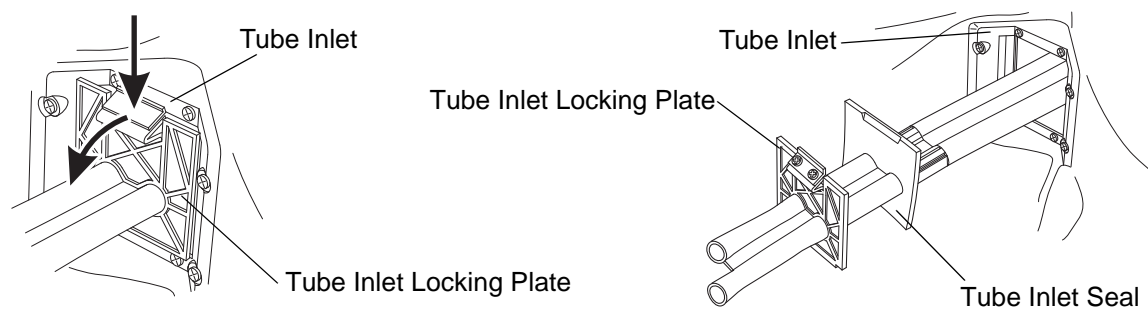


Note: Replace tubeset from inside the base cover assembly.  
Internal sub-assemblies not shown for clarity.

**Figure 58 - Replacing the Tubeset Assembly**



**Figure 59 - Disconnecting the Manifold Assembly from the Tubeset Assembly**



**Figure 60 - Releasing the Tubeset Locking Plate**

## 5 Removing the Tubeset Assembly

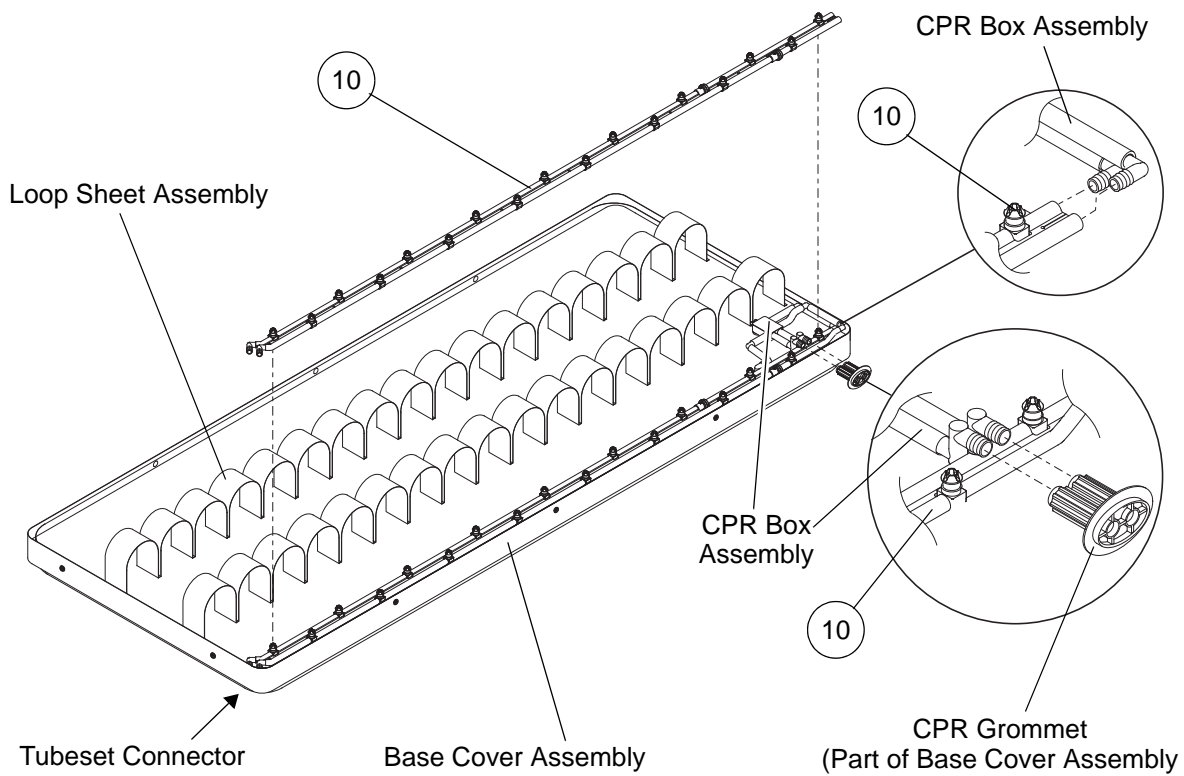
- 5.1 Remove the top cover assembly (refer to Page 75, Section 2).
- 5.2 At the foot end of the mattress on the side where the tubeset is situated, disconnect the single stud which secures the end cell assembly to the loop sheet assembly, and pull the end of the end cell assembly out of the way.
- 5.3 From the inside of the base cover assembly, disconnect the connectors on the end of the tubeset assembly (refer to Figure 59):
  - 5.3.1 The two angled connectors on the end of the manifold assembly from the two outer tubes on the tubeset assembly.
  - 5.3.2 On the central tube:
    - 5.3.2.1 On all variants except USA, remove the profile valve tube connector.
    - 5.3.2.2 On USA variants only, remove and retain the tubeset stopper (Fig 59, Item 20).
- 5.4 From the inside of the base cover assembly, push down on the top of the tube inlet locking plate, and release it from the top recess in the tube inlet in the corner of the base cover assembly (refer to Figure 60).
- 5.5 Lift the bottom of the tube inlet locking plate out of the bottom recess in the tube inlet.
- 5.6 Pull the tubeset inlet seal out of the tube inlet (refer to Figure 60).
- 5.7 Pull the tubeset assembly (Fig 58, Item 10) into the mattress through the tube inlet and remove it from the mattress.

## 6 Installing the Tubeset Assembly

- 6.1 Put the pump connector end of the tubeset assembly (Fig 58, Item 10) through the tube inlet from inside the base cover assembly.
- 6.2 Pass the tubeset assembly, including the retention strap, out through the tube inlet until the end of the tubeset is adjacent to the connectors on the end of the manifold assembly.
- 6.3 From the inside of the base cover assembly, connect the connectors on the end of the tubeset assembly (refer to Figure 59):
  - 6.3.1 The two angled connectors on the end of the manifold assembly from the two outer tubes on the tubeset assembly.
  - 6.3.2 On the central tube:
    - 6.3.2.1 On all variants except USA, connect the profile valve tube connector.
    - 6.3.2.2 On USA variants only, connect the tubeset stopper (Fig 59, Item 20).
- 6.4 Move the tube inlet seal along the tubeset, and into the tube inlet (refer to Figure 60).  
**Note:** Make sure the tube inlet seal fits securely in the tube inlet.
- 6.5 Move the tube inlet locking plate along the tubeset, and into the tube inlet (refer to Figure 60):
  - 6.5.1 Put the bottom of the tube inlet locking plate into the bottom recess in the tube inlet.
  - 6.5.2 Push down on the top of the tube inlet locking plate, and push the top of the tube inlet locking plate into the top recess in the tube inlet.  
**Note:** Make sure the top of the tube inlet locking plate "clicks" into position, to hold the tube inlet locking plate and tube inlet seal securely in the tube inlet.
- 6.6 At the foot end of the mattress on the side where the tubeset is situated, connect the single stud which secures the end cell assembly to the loop sheet assembly.
- 6.7 Install the top cover assembly (refer to Page 75, Section 2).

Table 31 - Tubeset Assembly and Tubeset Stopper Parts List

Item	Part Number	Description	Qty
10	464100	Tubeset Assembly	1
20	464078	Tubeset Stopper (USA Only)	1



**Figure 61 - Manifold Assembly**

**Table 32 - Manifold Assembly Parts List**

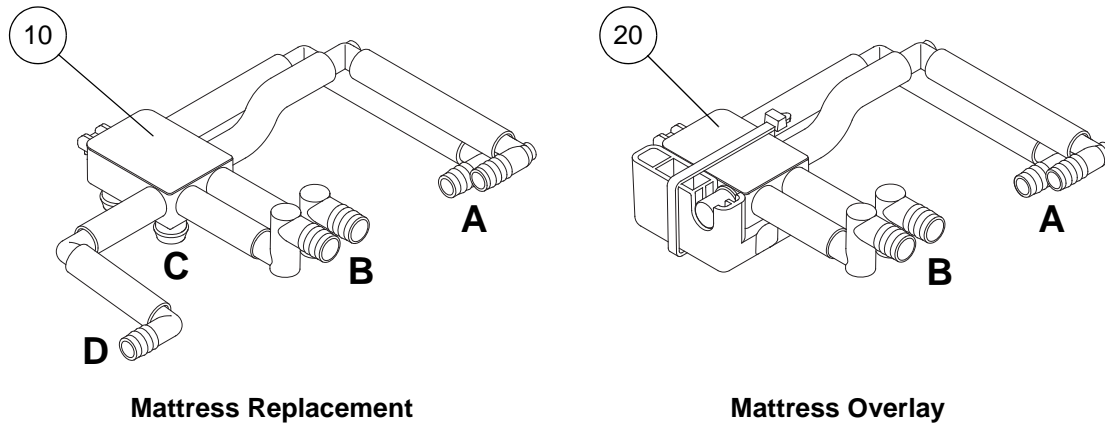
Item	Part Number	Description	Qty
40	464070	Manifold Assembly	1

## **7 Removing the Manifold Assembly**

- 7.1 Remove the top cover assembly (refer to Page 75, Section 2).
- 7.2 On the side of the mattress where the manifold is situated, disconnect the single stud at the end of each cell assembly from the loop sheet assembly. Repeat for all 17 cell assemblies.
- 7.3 On the underside of each cell assembly, pull the grommet off the manifold connector (Fig 61, Item 10). Repeat for all 17 cell assemblies.
- 7.4 Disconnect the manifold assembly from the CPR box assembly at the head end and the tubeset connector at the foot end.
- 7.5 Remove the manifold assembly from the loop sheet assembly.

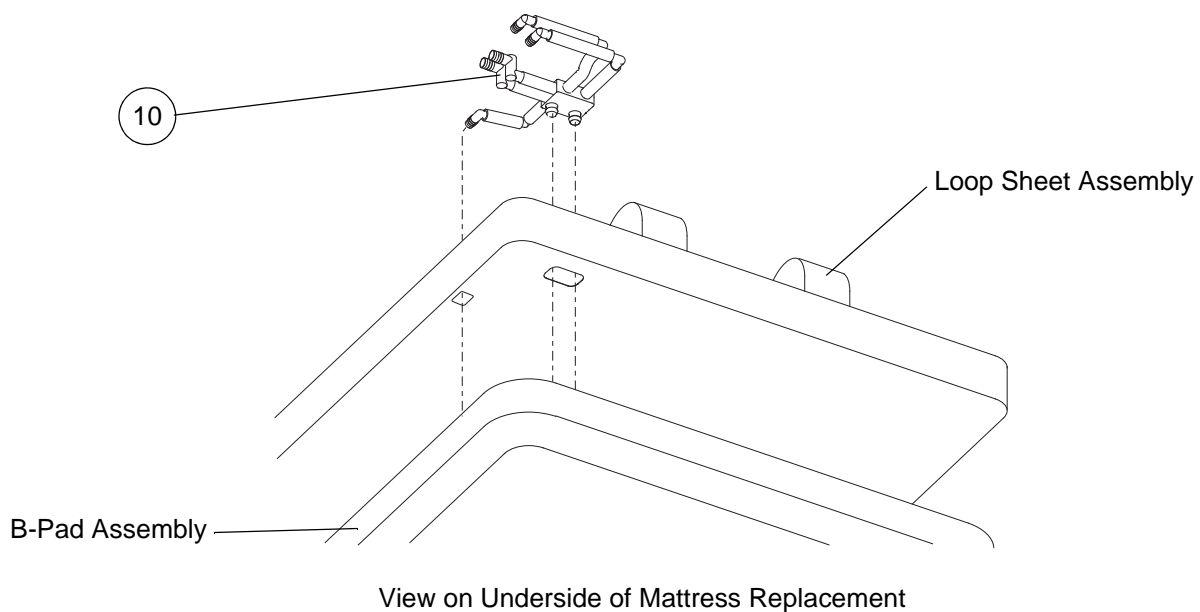
## **8 Installing the Manifold Assembly**

- 8.1 Put the manifold assembly (Fig 61, Item 10) into the loop sheet assembly.
- 8.2 Connect the manifold assembly to the CPR box assembly at the head end and the tubeset connector at the foot end.
- 8.3 Push the manifold connector into the cell grommet on the underside of each cell assembly. Repeat for all 17 cell assemblies.
- 8.4 On the side of the mattress where the manifold is situated, reconnect the single stud at the end of each cell assembly to the loop sheet assembly. Repeat for all 17 cell assemblies.
- 8.5 Install the top cover assembly (refer to Page 75, Section 2).



Key: A - Two connectors to tubes on the manifold assembly  
 B - Two connectors to the CPR grommet  
 C - Two connectors to the large grommets on the B-pad assembly  
 D - One connector to the right-angle grommet on the B-pad assembly

**Figure 62 - CPR Box Assembly Variants**



**Figure 63 - Connecting CPR Box Assembly to B-Pad Assembly**

**Table 33 - CPR Box Assembly Parts List**

Item	Part Number	Description	Qty
10	464062	CPR Box Assembly (Mattress Replacement)	1
20	464162	CPR Box Assembly (Mattress Overlay)	1



## 9 Removing the CPR Box Assembly on the Mattress Replacement

**Note:** *The mattress replacement and mattress overlay CPR box assemblies are not interchangeable or serviceable.*

- 9.1 Remove the top cover assembly (refer to Page 75, Section 2).
- 9.2 At the head end of the mattress, on the side where the CPR grommet is situated, disconnect the single stud at the end of the three head cell assemblies, and pull the end of the cell assemblies out of the way.
- 9.3 Disconnect the following connectors on the CPR box assembly (Fig 62, Item 10):
  - 9.3.1 From the two tubes on the CPR grommet on the base cover assembly (**B**).
  - 9.3.2 From the two tubes on the end of the manifold assembly (**A**).
  - 9.3.3 From the three grommets on the B-pad assembly, which is underneath the loop sheet assembly (**C** and **D**).
- 9.4 Remove the CPR box assembly from the loop sheet assembly.

## 10 Installing the CPR Box Assembly on the Mattress Replacement

- 10.1 Put the CPR box assembly (Fig 62, Item 10) into the loop sheet assembly.

**Note:** *Refer to Figure 61 for the correct orientation.*
- 10.2 Connect the following connectors on the CPR box assembly (Figure 62):
  - 10.2.1 To the three grommets on the B-pad assembly, underneath the loop sheet assembly (**C** and **D**).

**Note:** *The three connections pass through holes in the loop sheet assembly.*

**Note:** *To facilitate the insertion of the connectors into the grommets, apply a suitable lubricant, e.g. alcohol wipes, to each surface. Do not use soap as a lubricant.*
  - 10.2.2 To the two tubes on the end of the manifold assembly (**A**).
  - 10.2.3 To the two tubes on the CPR grommet on the base cover assembly (**B**).
- 10.3 At the head end of the mattress, on the side where the CPR grommet is situated, reconnect the single stud at the end of the three head cell assemblies.
- 10.4 Install the top cover assembly (refer to Page 75, Section 2).

## 11 Removing the CPR Box Assembly on the Mattress Overlay

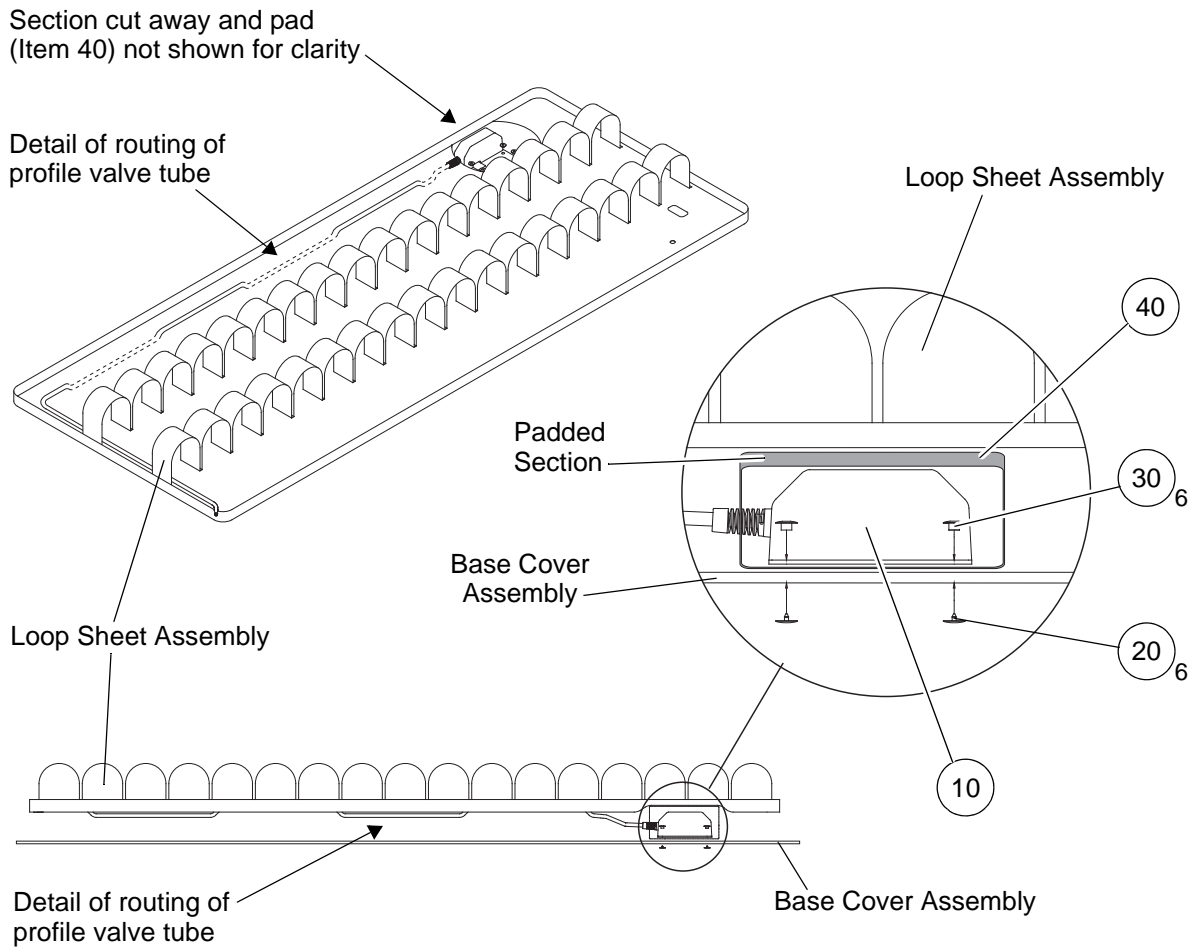
**Note:** *The mattress replacement and mattress overlay CPR box assemblies are not interchangeable or serviceable.*

- 11.1 Remove the top cover assembly (refer to Page 75, Section 2).
- 11.2 At the head end of the mattress, on the side where the CPR grommet is situated, disconnect the single stud at the end of the three head cell assemblies, and pull the end of the cell assemblies out of the way.
- 11.3 Disconnect the following connectors on the CPR box assembly (Fig 62, Item 20):
  - 11.3.1 From the two tubes on the CPR grommet on the base cover assembly (**B**).
  - 11.3.2 From the two tubes on the end of the manifold assembly (**A**).
- 11.4 Remove the CPR box assembly from the loop sheet assembly.

## 12 Installing the CPR Box Assembly on the Mattress Overlay

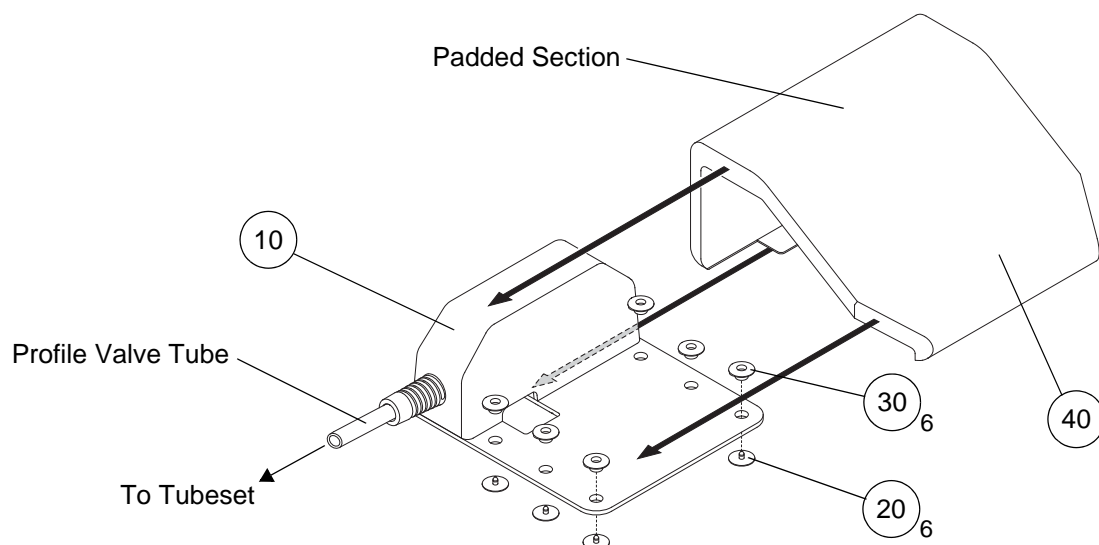
- 12.1 Put the CPR box assembly (Fig 62, Item 10) into the loop sheet assembly.

**Note:** *Refer to Figure 61 for the correct orientation.*
- 12.2 Connect the following connectors on the CPR box assembly (Figure 62):
  - 12.2.1 To the two tubes on the end of the manifold assembly (**A**).
  - 12.2.2 To the two tubes on the CPR grommet on the base cover assembly (**B**).
- 12.3 At the head end of the mattress, on the side where the CPR grommet is situated, reconnect the single stud at the end of the three head cell assemblies.
- 12.4 Install the top cover assembly (refer to Page 75, Section 2).



Note: Sub-assemblies not shown for clarity

### Figure 64 - Replacing the Profile Valve Main Assembly (All variants except USA)



**Figure 65 - Installing Protection Pad over Profile Valve Main Assembly**

### 13 Removing the Profile Valve Main Assembly (All Variants Except USA)

- 13.1 Remove the top cover assembly (refer to Page 75, Section 2).
- 13.2 At the foot end of the mattress on the side where the tubeset is situated, disconnect the single stud which secures the end cell assembly to the loop sheet assembly, and pull the end of the end cell assembly out of the way.
- 13.3 From the inside of the base cover assembly at the foot end of the mattress, disconnect the profile valve tube connector from the centre port on the end of the tubeset assembly (refer to Figure 59).
- 13.4 Turn the mattress over so that base cover assembly is on top.
- 13.5 At the head end of the mattress on the opposite side to the CPR assembly, carefully split apart the six 2-part plastic rivets (Fig 64, Items 20 and 30) which secure the profile valve main assembly (Fig 64, Item 10) to the base cover assembly.  
**Note:** Take care not to damage the base cover assembly when removing the rivets.
- 13.6 Remove the profile valve tube from the loop sheet assembly.  
**Note:** The profile valve tube is routed from the top side to the under side of the loop sheet assembly in several places, to retain it in the correct position.
- 13.7 Remove the profile valve main assembly, together with the protection pad (Fig 64, Item 40) which is fitted over the profile valve main assembly and the profile valve tube which is connected to it, from the mattress.

### 14 Installing the Profile Valve Main Assembly (All Variants Except USA)

- 14.1 Make sure the protection pad (Fig 65, Item 40) is fitted over the profile valve main assembly (Fig 65, Item 10).  
**Note:** The protection pad will only fit over the profile valve main assembly in one orientation, otherwise the six fixing holes will not be aligned (refer to Figure 65).  
**Note:** Make sure the padded part of the protection pad is on top of the profile valve main assembly, on the same side as the loop sheet assembly (refer to Figure 65).
- 14.2 Put the profile valve main assembly and protection pad onto the inside of the base cover assembly, at the head end of the mattress.  
**Note:** Make sure the position and orientation of both are correct (refer to Figure 64).
- 14.3 Install the six 2-part plastic rivets (Fig 65, Items 20 and 30) to secure the profile valve main assembly to the base cover assembly.
- 14.4 Carefully route the profile valve main assembly along the loop sheet assembly and underneath the cell assemblies, as detailed in Figure 64.  
**Note:** The profile valve main assembly is routed from the top side to the under side of the loop sheet assembly in several places, to retain it in the correct position.
- 14.5 From the inside of the base cover assembly at the foot end of the mattress, connect the profile valve tube connector onto the centre port on the end of the tubeset assembly (refer to Figure 59).
- 14.6 At the foot end of the mattress on the side where the tubeset is situated, connect the single stud which secures the end cell assembly to the loop sheet assembly.
- 14.7 Install the top cover assembly (refer to Page 75, Section 2).

**Table 34 - Profile Valve Main Assembly Parts List**

Item	Part Number	Description	Qty
10	464060	Profile Valve Main Assembly	1
20	627338	Plastic Rivet, Male	6
30	627339	Plastic Rivet, Female	6
40	464076	Protection Pad	1

## 15 Removing the Loop Sheet Assembly

- 15.1 Remove the top cover assembly (refer to Page 75, Section 2).
- 15.2 Remove the following sub-assemblies from the mattress:
  - 15.2.1 All 17 cell assemblies (refer to Page 75, Section 3).
  - 15.2.2 The manifold assembly (refer to Page 79, Section 7).
  - 15.2.3 The CPR box assembly (refer to Page 81, Section 9 or Section 11).
  - 15.2.4 On all variants except USA, remove just the profile valve tube (refer to Page 83, Section 13).

**Note:** Do not remove the profile valve main assembly from the base cover assembly.
- 15.3 Disconnect the 12 studs which secure the loop sheet assembly (Table 35, Item 20, Table 36, Item 20) to the base cover assembly.
- 15.4 Remove the loop sheet assembly from the base cover assembly.

## 16 Installing the Loop Sheet Assembly

- 16.1 Put the loop sheet assembly (Table 35, Item 20, Table 36, Item 20) into the base cover assembly.

**Note:** Make sure the orientation is correct.
- 16.2 Connect the 12 studs which secure the loop sheet assembly () to the base cover assembly.
- 16.3 Install the following sub-assemblies to the mattress:
  - 16.3.1 On all variants except USA, reconnect the profile valve tube (refer to Page 83, Section 14).

**Note:** Make sure the profile valve tube is routed correctly.

  - 16.3.2 The CPR box assembly (refer to Page 81, Section 10 or Section 12).
  - 16.3.3 The manifold assembly (refer to Page 79, Section 8).
  - 16.3.4 All 17 cell assemblies (refer to Page 75, Section 4).
- 16.4 Install the top cover assembly (refer to Page 75, Section 2).

## 17 Removing the B-Pad Assembly (Mattress Replacement Only)

- 17.1 Remove the loop sheet assembly (refer to Page 84, Section 15).
- 17.2 Disconnect the 10 studs which secure the B-pad assembly (Table 35, Item 30, Table 36, Item 30) to the base cover assembly.
- 17.3 Remove the B-pad assembly from the base cover assembly.

## 18 Installing the B-Pad Assembly (Mattress Replacement Only)

- 18.1 Put the B-pad assembly (Table 35, Item 30, Table 36, Item 30) into the base cover assembly.

**Note:** Make sure the orientation is correct.
- 18.2 Connect the 10 studs which secure the B-pad assembly (Table 35, Item 30, Table 36, Item 30) to the base cover assembly.
- 18.3 Install the loop sheet assembly (refer to Page 84, Section 16).

## 19 Removing the Base Cover Assembly

- 19.1 Remove the loop sheet assembly (refer to Page 84, Section 15).
- 19.2 On mattress replacements, remove the B-pad assembly (refer to Page 84, Section 17).
- 19.3 Remove the profile valve main assembly from the base cover assembly (refer to Page 83, Section 13).
- 19.4 The base cover assembly can now be replaced (Table 35, Item 10, Table 36, Item 10).

## 20 Installing the Base Cover Assembly

- 20.1 Make sure the base cover assembly (Table 35, Item 10, Table 36, Item 10) is correct.
- 20.2 On mattress replacements, install the B-pad assembly (refer to Page 84, Section 17).
- 20.3 Install the loop sheet assembly (refer to Page 84, Section 16).
- 20.4 Install the profile valve main assembly onto the base cover assembly (refer to Page 83, Section 14).

**Table 35 - Mattress Sub-Assemblies (Standard Mattress) Parts List**

Item	Part Number	Description	Qty
10	464050	Base Cover Assy (All Except USA), Standard, Mattress Replacement	1
-	464550	Base Cover Assy (All Except USA), Standard, Mattress Overlay	1
-	464153	Base Cover Assy (USA Only), Standard, Mattress Replacement	1
-	464559	Base Cover Assy (USA Only), Standard, Mattress Overlay	1
20	464090	Loop Sheet Assembly, Standard	1
30	464063	B-Pad Assembly, Standard (Mattress Replacement Only)	1

**Table 36 - Mattress Sub-Assemblies (Narrow Mattress) Parts List**

Item	Part Number	Description	Qty
10	464250	Base Cover Assy (All Except USA), Narrow, Mattress Replacement	1
-	464555	Base Cover Assy (All Except USA), Narrow, Mattress Overlay	
20	464290	Loop Sheet Assembly, Narrow	1
30	464263	B-Pad Assembly, Narrow (Mattress Replacement Only)	1



## CHAPTER 7

### SEAT CUSHION REPAIR

**WARNING: BEFORE PERFORMING ANY REPAIR PROCEDURES, MAKE SURE THAT THE SEAT CUSHION HAS BEEN ADEQUATELY DECONTAMINATED.**

#### 1 General

This chapter details repair procedures for the **Alpha RESPONSE** seat cushion. All repairs should be carried out by Huntleigh approved service personnel.

To carry out the repair procedures, fully deflate the seat cushion first, as follows:

- 1.1 Disconnect the tubeset between the seat cushion and the pump.
- 1.2 Depress the two small dump valves on the underside of the seat cushion base cover to deflate the seat cushion.

After carrying out a service or any repairs, the mattress must be tested for serviceability. Carry out an inflation test on the seat cushion in accordance with Chapter 4 "Testing", Page 43, Section 11.

#### 2 Removing the Top Cover Assembly

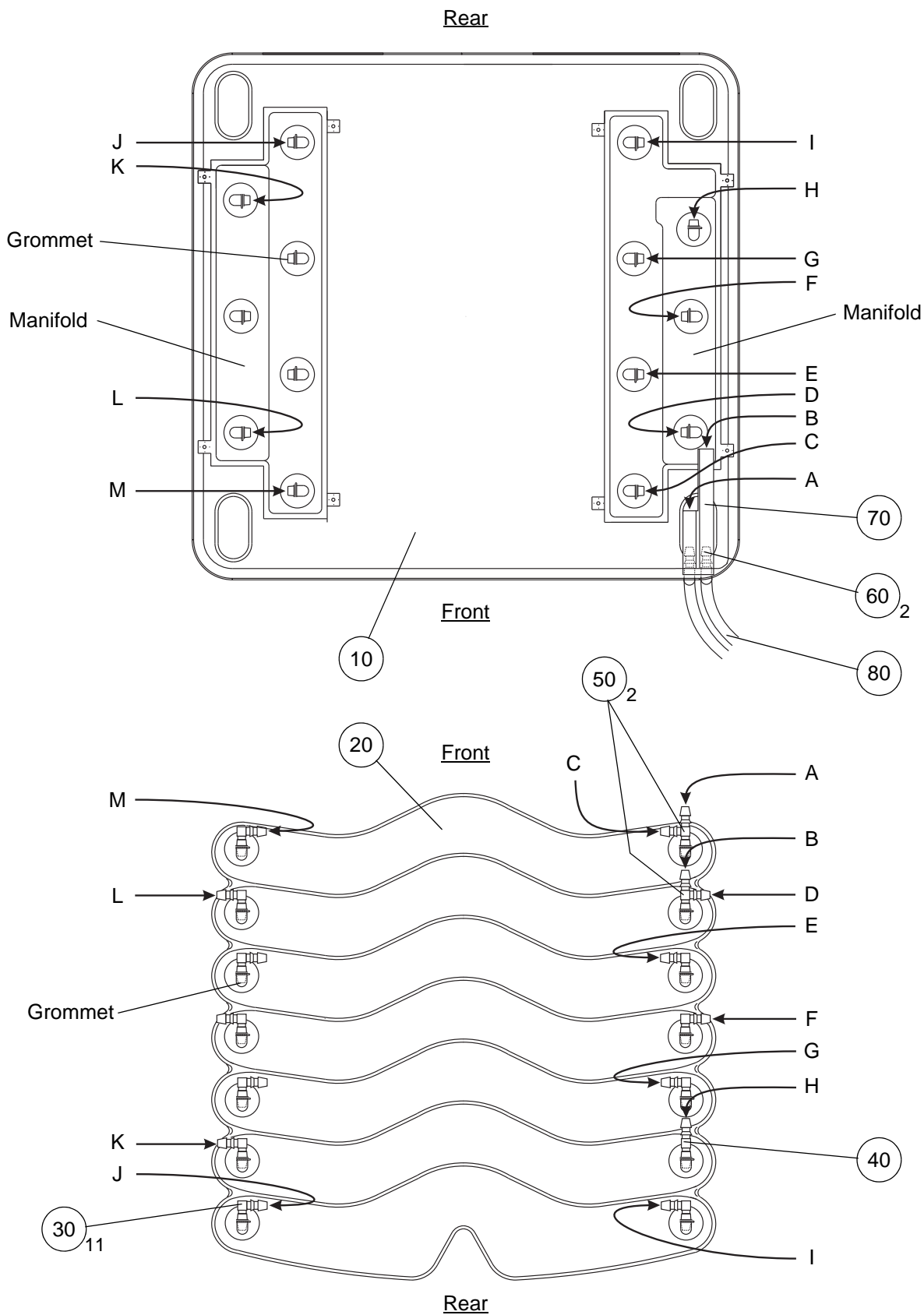
- 2.1 Undo the zip which secures the top cover assembly (Table 37, Item 10) to the base sheet assembly.
- 2.2 Remove the top cover assembly.

#### 3 Installing the Top Cover Assembly

- 3.1 Position the top cover assembly (Table 37, Item 10) over the base sheet assembly, with the logo uppermost.
- 3.2 Fasten the zip to secure the top cover assembly to the base sheet assembly.

Table 37 - Top Cover Parts List

Item	Part Number	Description	Qty
10	464088	Top Cover Assembly	1



**Figure 66 - Replacing the Welded Cell Assembly**



## 4 Removing the Welded Cell Assembly

The seven cells in the seat cushion are not individual, replaceable cells but are manufactured as a single, welded assembly which can only be replaced as a single, complete item (the welded cell assembly).

There are four short manifolds welded into the base sheet assembly, two at each side of the welded cell assembly. The welded cell assembly is connected to the manifolds via 14 connectors (elbow, straight and "T").

- 4.1 Remove the top cover assembly (Refer to Page 87, Section 2).
- 4.2 Carefully pull the two T-connectors (Fig 66, Item 50) out of the internal tube assembly (Fig 66, Item 70).
- 4.3 Carefully pull the 14 connectors (Fig 66, Items 30, 40 and 50) out of the grommets on the manifolds on the base assembly (Fig 66, Item 10).  
**Note:** *Keep all 14 connectors in the grommets on the welded cell assembly (Fig 66, Item 20).*
- 4.4 Carefully pull all 14 connectors (Fig 66, Items 30, 40 and 50) out of the grommets in the welded cell assembly (Fig 66, Item 20).

## 5 Installing the Welded Cell Assembly

**Note:** *The labels by each connector on Figure 66, e.g. "A", "B", etc., are an aid to installing the welded cell assembly, by showing which connector on the welded cell assembly is connected to which grommet on the base assembly i.e. "A" to "A", etc.*

- 5.1 Put the base assembly (Fig 66, Item 10) and the welded cell assembly (Fig 66, Item 20) down with the grommets pointing upwards.  
**Note:** *Installing the connectors is made easier if the parts are wetted with methylated spirit immediately prior to insertion.*
- 5.2 Push the following connectors into the grommets on the welded cell assembly:
  - 5.2.1 The single straight connector (Fig 66, Item 40), labelled "H".
  - 5.2.2 The two T-connectors (Fig 66, Item 50), labelled "C" and "D".
  - 5.2.3 The 11 elbow connectors (Fig 66, Item 30), labelled "E" to "G" and "I" to "M".**Note:** *Make sure the orientation of each of the 14 connectors is exactly as shown in Figure 66.*
- 5.3 Turn the welded cell assembly over so that the connectors are on the bottom.
- 5.4 Position the welded cell assembly on top of the base assembly.  
**Note:** *Make sure the front of the welded cell assembly is directly above the front of the base assembly (Refer to Figure 66).*
- 5.5 Push the two T-connectors (Fig 66, Item 50) into the ends of the internal tube assembly (Fig 66, Item 70), labelled "A" and "B".
- 5.6 Push the 14 connectors on the welded cell assembly into the corresponding grommet in the manifolds on the base assembly (Fig 66, Item 10), labelled "C" to "M".
- 5.7 Install the top cover assembly (Refer to Page 87, Section 3).

**Table 38 - Welded Cell Assembly Parts List**

Item	Part Number	Description	Qty
10	464089	Base Assembly	1
20	PXS056	Cell Assembly, Welded	1
30	403305	Connector, Elbow	11
40	PXS302	Connector, Straight	1
50	401300	T-Connector	2
60	PXS309	Connector, Stepped	2
70	PXS067	Tube Assembly, Internal	1
80	464068	Pump Tubeset Assembly	1

## 6 Removing the Pump Tubeset Assembly

**Note:** *It is not necessary to remove the top cover assembly to remove the pump tubeset assembly.*

- 6.1 Carefully pull the two tubes on the pump tubeset assembly (Fig 66, Item 80) off of the two stepped connectors (Fig 66, Item 60), which are attached to the internal tube assembly (Fig 66, Item 70).

**Note:** *Leave the two stepped connectors and internal tube assembly connected to the seat cushion.*

## 7 Installing the Pump Tubeset Assembly

- 7.1 Push the two tubes on the pump tubeset assembly (Fig 66, Item 80) onto the two stepped connectors (Fig 66, Item 60), which are attached to the internal tube assembly (Fig 66, Item 70), and remove the pump tubeset assembly.

**Note:** *Installing the connectors is made easier if the parts are wetted with methylated spirit immediately prior to insertion.*

**Note:** *The orientation of the two tubes on the pump tubeset assembly is not important.*

## 8 Removing a Retaining Strap Assembly

- 8.1 Turn the seat cushion over so that retaining strap assemblies (Fig 67, Item 10) are on top.
- 8.2 Separate the clips, and untie or cut through the webbing on the retaining strap assembly where it is secured to the anchor grommet on the base assembly, and remove the webbing from the anchor grommet.
- 8.3 Remove the mating retaining strap assembly.

## 9 Installing a Retaining Strap Assembly

There are two retaining strap assemblies on the seat cushion, and each one comprises two different retaining straps. Both retaining straps have both a side-release buckle and a mating receptacle: one has the side-release buckle at the end of the long strap and the other has the mating receptacle at the end of the long strap.

**Note:** *Always replace both retaining straps, and make sure that the correct retaining straps are installed in the correct positions (Refer to Figure 67).*

- 9.1 Insert the plain end of the webbing on the retaining strap assembly (Fig 67, Item 10) into the anchor grommet, and under the anchor bar.
- 9.2 Feed the plain end of the webbing through until the end exits the opposite side of the anchor grommet.
- 9.3 Open the loop on the plain end of the webbing, and insert the other end of the webbing with the side-release buckle or mating receptacle through the loop.
- 9.4 Tighten the webbing on the anchor grommet to secure.
- 9.5 Repeat the procedure to install the mating retaining strap.

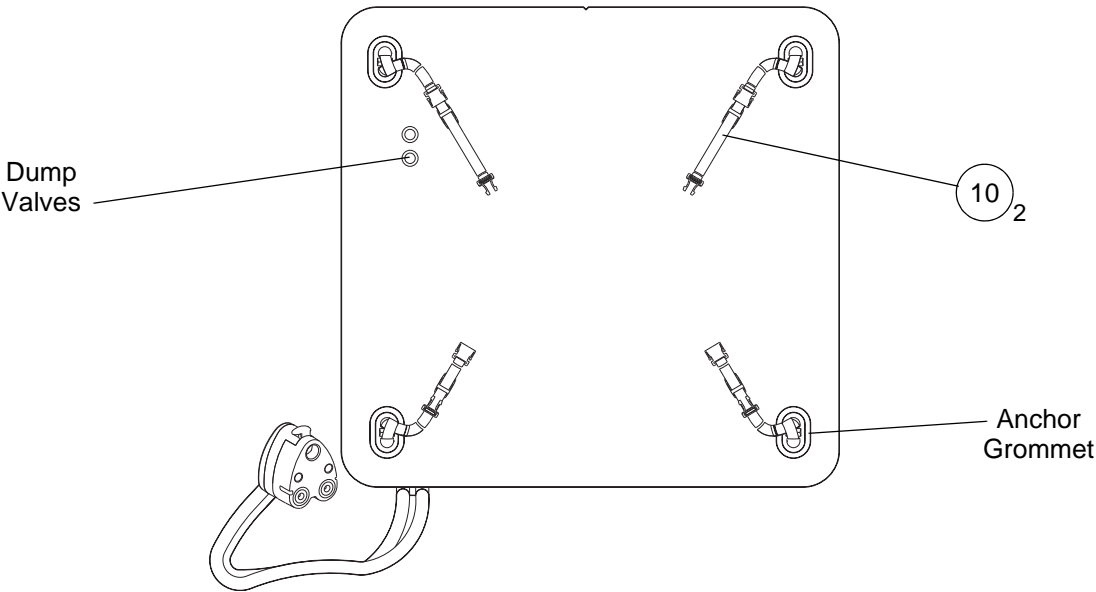


Figure 67 - Replacing a Retaining Strap Assembly

Table 39 - Retaining Strap Assembly Parts List

Item	Part Number	Description	Qty
10	PXS066	Retaining Strap Assembly, Pair	2

## 10 Replacing the Base Assembly

- 10.1 Remove the top cover assembly (Refer to Page 87, Section 2).
- 10.2 Remove the pump tubeset assembly from the base assembly (Refer to Page 90, Section 6).
- 10.3 Remove the two stepped connectors (Fig 66, Item 60) and internal tube assembly (Fig 66, Item 70) from the base assembly.
- 10.4 Remove the welded cell assembly from the base assembly (Refer to Page 89, Section 4).  
**Note:** Make sure all 14 connectors (Fig 66, Items 30, 40 and 50) are removed from the grommets on the manifolds on the base assembly (Fig 66, Item 10).
- 10.5 Remove both retaining strap assemblies (Refer to Page 90, Section 8).
- 10.6 Discard the old base assembly.
- 10.7 Place a new base assembly (Table 40, Item 10) down on a flat surface.
- 10.8 Install the welded cell assembly onto the base assembly (Refer to Page 89, Section 5).
- 10.9 Push the internal tube assembly (Fig 66, Item 70) onto the two T-connectors (Fig 66, Item 50) on the welded cell assembly, labelled "A" and "B".  
**Note:** Refer to Figure 66 for the orientation of the internal tube assembly.
- 10.10 Push the two stepped connectors (Fig 66, Item 60) into the ends of the internal tube assembly.
- 10.11 Install the pump tubeset assembly onto the stepped connectors (Refer to Page 90, Section 7).
- 10.12 Install both retaining strap assemblies (Refer to Page 90, Section 9).
- 10.13 Install the top cover assembly (Refer to Page 87, Section 3).









**Table 40 - Base Assembly Parts List**

Item	Part Number	Description	Qty
10	464089	Base Assembly	1

## CHAPTER 8

### TECHNICAL SPECIFICATION

<b>PUMP</b>	
Supply Voltage:	100-230V
Supply Frequency:	50/60Hz
Power Input:	27VA
Size: (Length x Height x Depth)	240mm (L) x 210mm (H) x 135mm (D) [9.5in. (L) x 8.3in. (H) x 5.3in. (D)]
Weight:	3.2kg (7lb)
Case Material:	Fire Retardant ABS Plastic
Plug Fuse Rating:	5A to BS1362 (UK ONLY)
Degree of protection against electric shock:	Class II, Double Insulated with Functional Earth Type BF
Degree of protection against liquid ingress:	IPX0
Mode of operation:	Continuous

<b>SYMBOLS</b>							
	Type BF		Do not dispose of in domestic refuse		Alternating Current		Double Insulated
	Dangerous voltage		Refer to accompanying documents	<b>SN:</b>	Serial Number		
	With respect to electric shock, fire and mechanical hazards only in accordance with UL60601-1 and CAN/CSA C22.2 No. 601.1. MEDICAL EQUIPMENT		Refer to the User Manual	<b>Ref:</b>	Model number		

<b>ENVIRONMENTAL INFORMATION</b>			
Condition	Temperature Range	Relative Humidity	Atmospheric Pressure
<i>Operating</i>	+12°C to +40°C (+54°F to +104°F)	20% to 75% (non-condensing)	700hPa to 1060 hPa
<i>Storage (Long Term)</i>	+12°C to +40°C (+54°F to +104°F)	20% to 75% (non-condensing)	500 hPa to 1060 hPa
<i>Storage (Short Term) (less than 24 hours)</i>	-20°C to +50°C (-4°F to +122°F)	20% to 95% (non-condensing)	500 hPa to 1060 hPa

**MATTRESS DIMENSIONS**

Description	Size (Height x Length x Width)	Cell Material	Base Cover Material
Mattress Replacement:			
Standard:	205mm (H) x 2090mm (L) x 886 (W) [8in. (H) x 82.3in. (L) x 34.9in. (W)]	Polyurethane	PU Laminate
Narrow:	205mm (H) x 2090mm (L) x 806 (W) [8in. (H) x 82.3in. (L) x 31.7in. (W)]	Polyurethane	PU Laminate
Mattress Overlay:			
Standard:	115mm (H) x 2090mm (L) x 886 (W) [4.5in. (H) x 82.3in. (L) x 34.9in. (W)]	Polyurethane	PU Laminate
Narrow:	115mm (H) x 2090mm (L) x 806 (W) [4.5in. (H) x 82.3in. (L) x 31.7in. (W)]	Polyurethane	PU Laminate







**MATTRESS WEIGHTS (BOXED)**



Mattress Replacement:	11.7kg (26 lb)
Mattress Overlay:	9.7kg (21 lb)

**SEAT CUSHION**

Length:	470mm (18.5in.)
Width:	455mm (17.9in.)
Height:	50mm (2in.)
Weight (Boxed)	1.4kg (3 lb)
Cell Material:	Polyurethane

**CLEANING SYMBOLS**

	Do Not Use Phenol-based cleaning Solutions		Tumble dry at a cool setting
	Do not iron		Tumble dry at 80-85°C (176-185°F)
	Use solution diluted to 1000 ppm of Available Chlorine		Wipe surface with damp cloth

 > 3 min	Wash at 71°C (160°F) for a minimum of 3 minutes
 > 10 min	Wash at 65°C (149°F) for a minimum of 10 minutes

COVER SPECIFICATION		
Feature	Standard Cover (Dartex) <sup>®</sup>	Advantex <sup>®</sup>
<b>Removable Cover</b>	Yes	Yes
<b>Moisture Vapour Permeable</b>	Yes	Yes
<b>Air Permeable</b>	No	No
<b>Low Friction</b>	Yes	18% lower
<b>Water Resistant / Repellent</b>	Yes	Yes
<b>Infection Control</b>	Material coating is Bacteriostatic, fungistatic, antimicrobial	Material coating is Bacteriostatic, fungistatic, antimicrobial
<b>Fire Retardant</b>	BS 7175: 0,1 & 5	BS 7175: 0,1 & 5
<b>2-Way Stretch</b>	Yes	Some
<b>Washing Conditions</b>	MAX 95°C (203°F) for 15 mins <sup>(a)</sup>	MAX 95°C (203°F) for 15 mins <sup>(a)</sup>
<b>Drying Conditions</b>	Tumble Dry up to 130°C (266°F) or Air Dry	Tumble Dry <b>ONLY</b> at 80-85°C (176°F-185°F)
<b>Life Span</b>	50 Wash Cycles (minimum)	50 Wash Cycles (minimum)
<b>Application Area</b>	Acute and Homecare	Acute and Homecare

- a. Examine your local policy to determine the time/temperature ratio required to achieve thermal disinfection.



## CHAPTER 9

### PARTS LIST

#### 1 Overall Assembly Parts List

Part Number	Description
<b>Pump Assembly</b>	
464001	<i>Alpha</i> RESPONSE Pump, UK
464003	<i>Alpha</i> RESPONSE Pump, USA
464004 (464EUR)	<i>Alpha</i> RESPONSE Pump, Euro
464009AU	<i>Alpha</i> RESPONSE Pump, Australia
464009BR (464UNI)	<i>Alpha</i> RESPONSE Pump, Brazil
464009CH (464UNI)	<i>Alpha</i> RESPONSE Pump, Switzerland
464009CN (464UNI)	<i>Alpha</i> RESPONSE Pump, China
464009ZA (464UNI)	<i>Alpha</i> RESPONSE Pump, South Africa/India
<b>Mattress Replacement Assemblies</b>	
465001ADV	<i>Alpha</i> RESPONSE Mattress Replacement (Advantex), RoW
465001DAR	<i>Alpha</i> RESPONSE Mattress Replacement (Dartex), RoW
465002ADV	<i>Alpha</i> RESPONSE Mattress Replacement, Narrow (Advantex), RoW
465002DAR	<i>Alpha</i> RESPONSE Mattress Replacement, Narrow (Dartex), RoW
465006ADV	<i>Alpha</i> RESPONSE Mattress Replacement (Advantex), USA
465006DAR	<i>Alpha</i> RESPONSE Mattress Replacement (Dartex), USA
<b>Mattress Overlay Assemblies</b>	
465003ADV	<i>Alpha</i> RESPONSE Mattress Overlay (Advantex), RoW
465003DAR	<i>Alpha</i> RESPONSE Mattress Overlay (Dartex), RoW
465004ADV	<i>Alpha</i> RESPONSE Mattress Overlay, Narrow (Advantex), RoW
465004DAR	<i>Alpha</i> RESPONSE Mattress Overlay, Narrow (Dartex), RoW
465008ADV	<i>Alpha</i> RESPONSE Mattress Overlay (Advantex), USA
465008DAR	<i>Alpha</i> RESPONSE Mattress Overlay (Dartex), USA
<b>Seat Cushion</b>	
465005DAR	<i>Alpha</i> RESPONSE Seat Cushion

## 2 Pump Parts List

Part Number	Description	Fig - Item	Qty
464400	Front Case Moulding	-	1
464425	• AV Pillar	41-10	4
PKG830	• ArjoHuntleigh Domed Badge	-	1
507413	• Rubber Foot	37-30	2
464108	Rear Case Assembly <i>(Includes the filter felt and cover, bed hooks and covers, carry handle insert and internal filter foams. Does not include the rear or serial number labels, USB cover and mains power cable and cable cover.)</i>	37-10	1
507374	• Filter Felt, Pump Inlet	35-10	1
630326	• Filter Cover	35-20	1
FAS257	• Screw, 3 dia x 10 long, Torx, Pan Head PT	35-30	1
CAB305	• Mains Power Cable, IEC, Straight Coiled, UK	36-10	1
CAB303	• Mains Power Cable, IEC, Straight Coiled, Euro	36-10	1
CAB306	• Mains Power Cable, IEC, Straight Coiled, USA	36-10	1
CAB307	• Mains Power Cable, IEC, Straight Coiled, Orange Lead, Australia	36-10	1
CAB308	• Mains Power Cable, IEC, Straight Coiled, Swiss	36-10	1
CAB311	• Mains Power Cable, IEC, Straight Coiled, South African/Indian	36-10	1
CAB302	• Mains Power Cable, Short, Male IEC to Female IEC	36-10	1
464402	• IEC Cable Cover	36-20	1
FAS257	• Screw, 3 dia x 10 long, Torx, Pan Head PT	36-30	2
464417	• USB Cover	36-40	1
LAB405	• Rear Label	36-50	1
REF	• Serial Number Label	36-60	1
FAS258	• Screw, 3 dia x 16 long, Torx, Pan Head PT	37-20	4
507413	• Rubber Foot	37-30	6
464111	Compressor & Bracket Assembly <i>(Comprises the compressor, metal bracket, AV mounts, filter felt, filter clip, F-tube, bump stops and tube retaining clip. Does not include the AV pillars.)</i>	43-10	1
500417	• Filter Felt, Compressor Inlet	42-10	1
500410	• Filter Clip	42-20	1
500416	• AV Mount	40-10	4

Part Number	Description	Fig - Item	Qty
464110	Motor & Pressure Module Assembly (Comprises the motor, pressure module and microswitch. Does not include the microswitch cable assembly.)	45-10	1
464437	• Microswitch Wire Kit	45-20	1
FAS257	• Screw, 3 dia x 10 long, Torx, Pan Head PT	45-30	3
464115	Outlet Manifold Assembly (Includes the O-rings and rear PCB and cable assembly.)	44-10	1
630364	• O-Ring, 6.8mm dia	38-10	3
464414	Display PCB Assembly (All variants except USA) (Includes the rechargeable battery and the red and clear transducer tubes.)	47-10	1
464414US	Display PCB Assembly (USA Only)	47-10	1
FAS257	• Screw, 3 dia x 10 long, Torx, Pan Head PT	47-20	2
464600	• Replacement Battery Kit (Comprises the rechargeable battery, adhesive pad and cable tie.)	50-10	1
464421	Display Membrane Label	51-10	1
464416	Power Supply PCB Assembly	52-10	1
FAS257	• Screw, 3 dia x 10 long, Torx, Pan Head PT	52-20	6
630454	Bio-Filter	54-10 55-10	1
464455	T-Connector, Reducer	54-50 55-50	1
464455	T-Connector, Reducer	54-60 55-60	1
464442	T-Connector, Microbore	54-100 55-100	1
464442	T-Connector, Microbore	54-150 55-150	1

Part Number	Description	Cut Length (mm)	Fig - Item	Qty
SW393	Tube, Blue Silicone Rubber, 6mm ID 10mm OD	130 ± 2	54-20 55-20	1
PAC162	Tube, White Silicone Rubber, 3/16" ID 5/16" OD	95 ± 2	54-30 55-30	1

Part Number	Description	Cut Length (mm)	Fig - Item	Qty
SW393	Tube, Blue Silicone Rubber, 6mm ID 10mm OD	28 ± 1	54-40 55-40	1
SW393	Tube, Blue Silicone Rubber, 6mm ID 10mm OD	28 ± 1	54-70 55-70	1
464116	Restrictor Tube Assembly	-	54-80 55-80	1
PAC162	Tube, White Silicone Rubber, 3/16" ID 5/16" OD	70 ± 2	54-90 55-90	1
464439	Tube, Clear Silicone Rubber, xmm ID ymm OD	40 ± 1	54-110 55-110	1
SW393	Tube, Blue Silicone Rubber, 6mm ID 10mm OD	80 ± 2	54-120 55-120	1
SW393	Tube, Blue Silicone Rubber, 6mm ID 10mm OD	90 ± 2	54-130 55-130	1
PAC162	Tube, White Silicone Rubber, 3/16" ID 5/16" OD	70 ± 2	54-140 55-140	1

### 3 Mattress Parts List

Part Number	Description	Fig-Item	Qty
464080	Top Cover Assembly, Standard Mattress, Advantex	-	1
464082	Top Cover Assembly, Standard Mattress, Dartex	-	1
464280	Top Cover Assembly, Narrow Mattress, Advantex	-	1
464282	Top Cover Assembly, Narrow Mattress, Dartex	-	1
464050	Base Cover Assy (All Except USA), Standard, Mattress Replacement	-	1
464550	Base Cover Assy (All Except USA), Standard, Mattress Overlay	-	1
464153	Base Cover Assy (USA Only), Standard, Mattress Replacement	-	1
464559	Base Cover Assy (USA Only), Standard, Mattress Overlay	-	1
464250	Base Cover Assy (All Except USA), Narrow, Mattress Replacement	-	1
464555	Base Cover Assy (All Except USA), Narrow, Mattress Overlay	-	1
464090	Loop Sheet Assembly, Standard	-	1
464290	Loop Sheet Assembly, Narrow	-	1
464063	B-Pad Assembly, Standard (Mattress Replacement Only)	-	1
464263	B-Pad Assembly, Narrow (Mattress Replacement Only)	-	1

Part Number	Description	Fig - Item	Qty
AR2M060	Cell Assembly, Standard Mattress	56-10	17
464260	Cell Assembly, Narrow Mattress	56-10	17
AR2M060	Cell Assembly, Standard Mattress	57-10	15
464260	Cell Assembly, Narrow Mattress	57-10	15
464077	Short Cell Assembly, Standard Mattress	57-20	2
464264	Short Cell Assembly, Narrow Mattress	57-20	2
464100	Tuberset Assembly	58-10 59-10	1
464078	• Tuberset Stopper (USA Only)	59-20	1
464070	Manifold Assembly	61-10	1
464062	CPR Box Assembly (Mattress Replacement)	62-10 63-10	1
464162	CPR Box Assembly (Mattress Overlay)	62-20	1
464060	Profile Valve Main Assembly	64-10 65-10	1
627338	• Plastic Rivet, Male	64-20 65-20	6
627339	• Plastic Rivet, Female	64-30 65-30	6
464076	• Protection Pad	64-40 65-40	1

#### 4 Seat Cushion Parts List

Part Number	Description	Fig - Item	Qty
464088	Top Cover Assembly	-	1
464089	Base Assembly	66-10	1
PXS066	• Retaining Strap Assembly, Pair	67-10	2
PXS056	Cell Assembly, Welded	66-20	1
403305	• Connector, Elbow	66-30	11
PXS302	• Connector, Straight	66-40	1

Part Number	Description	Fig - Item	Qty
401300	• T-Connector	66-50	2
PXS309	• Connector, Stepped	66-60	2
PXS067	Tube Assembly, Internal	66-70	1
464068	Pump Tubeset Assembly	66-80	1

## CHAPTER 10

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