# TABLE OF CONTENTS

1. **INTRODUCTION**
   1.1. Overview

2. **INITIAL INSPECTION**
   2.1. Visual Inspection
   2.2. Quality Control

3. **INSTALLATION**
   3.1. Installing the Microscope Mount
      3.1.1. PCS-500 Series Microscope Mounts (Optional)
      3.1.2. Universal Post and Platform Mount (Optional)
   3.2. Mounting the LBM-7 Manual manipulator to your Microscope Mount
   3.3. Configuring the LBM-7 Manual manipulator
      3.3.1. Right-Sided Operation
      3.3.2. Left-Sided Operation
   3.4. Mounting a Pipette
      3.4.1. Accessing the V groove for mounting or removing a rod based holder
      3.4.2. Setting the angle of the probe clamping assembly and repeatable stop
   3.5. Mounting an Extension Bracket (Optional)
   3.6. Mounting an L-shaped Bracket (Optional)
   3.7. Mounting a Sliding Bracket (Optional)
   3.8. Mounting the Burleigh Inchworm Motor™ Mounting Bracket (Optional)
   3.9. Fitting the Extra Smooth Adjusters (Optional)

4. **OPERATION**
   4.1. Adjusting the Approach Angle
   4.2. Changing Pipettes
   4.3. Setting the Adjustable Stop (in base rotary stage)
1. INTRODUCTION

1.1. Overview

The LBM-7 Manual manipulator is a compact, stable and robust 7-Axis micropositioner for high precision 3D manual positioning. Micron resolution means that you are assured of fingertip control.

Although it has been designed for the alignment of stimulation electrodes and perfusion pipettes during patch clamp recording experiments, the characteristics of the instrument are useful for many other applications requiring manual precision positioning capabilities.

The manipulator is easily mounted on or next to your microscope. A custom built probe clamping assembly, with user selectable mechanical stops, is provided for holding stimulation electrodes and perfusion pipettes with a diameter of up to 10 mm. High quality, pre-stressed linear ball bearing stages with 25mm of travel (12.7mm in the Y axis) guarantee consistent performance and reliability. Special rotational adjustments optimise pipette working angles and ensure quick and easy pipette exchange.
2. INITIAL INSPECTION

2.1. Visual Inspection

The LBM-7 Manual manipulator has been packaged in a special carton designed to give maximum protection during shipment. If the outside of the shipping carton is damaged, notify your shipping department immediately. The shipping department may wish to notify the carrier at this point.

a) If the shipping carton is undamaged externally, carefully remove and identify all of the components listed below.

The LBM-7 Manual manipulator consists of the following components:

- LBM-7 Manipulator Assembly (4 linear stages; 2 rotary adjustments and probe clamping assembly)
- Mounting Kit
  The LBM-7 can be attached directly to metric or imperial through holed patterns
  Metric:
  M6 x 40mm screws (Qty: 4)
  M6 x 20mm (Qty: 4)
  M6 Nuts (Qty: 4)
  M6 Washers (Qty: 4)
  Imperial:
  ¼-20 x 1.5" (Qty: 4)
  ¼-20 x 0.75" (Qty: 4)
  ¼-20 nuts
  ¼-20 washers
- Allen Keys:
  2mm (Qty: 1)
  2.5mm (Qty: 1)
  5mm (Qty: 1)
  3/16" (Qty: 1)
b) Optional Components may include:

- Extension Bracket for probe clamping assembly
- Sliding Extension Bracket for probe clamping assembly
- Burleigh Inchworm™ motor mounting Bracket
- L-shaped off-set bracket
- Extra Smooth Adjusters

If any components are missing, contact Scientifica in the UK or your local representative. Save the special carton for future storage or transportation of the LBM-7 Manual manipulator.

2.2 Quality Control

Each LBM-7 Manual manipulator undergoes many stages of inspection, including a pre-shipment burn-in. It is designed for years of trouble-free operation. In the unlikely event that problems occur, please contact Scientifica in the UK or your local representative for instructions. Our Customer Service team are ready to help with advice, parts and repair services.
3. INSTALLATION

Correct mounting is essential for providing good system performance. It is important that the mounting system be mechanically and thermally stable, whilst providing flexibility for different experimental set-ups.

3.1. Installing the Microscope Mount

Scientifica recommends using a microscope mount that attaches directly to the user’s microscope or a post and platform style mount. These methods provide excellent stability and convenience.

3.1.1. PCS-500 Series Microscope Mounts (Optional)

The optional PCS-500 Series Microscope Mounts provide a stable platform for the LBM-7 Manual manipulator. They are designed for simple installation by the user and to minimise interference with other microscope accessories. The range available for inverted microscopes is detailed below:

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCS-500-11</td>
<td>Mount for Olympus IMT-2</td>
</tr>
<tr>
<td>PCS-500-12</td>
<td>Mount for Nikon TMD</td>
</tr>
<tr>
<td>PCS-500-13</td>
<td>Mount for Zeiss Axiovert 10 with fixed stage</td>
</tr>
<tr>
<td>PCS-500-14</td>
<td>Mount for the Nikon Diaphot 200/300 and TE 200/300</td>
</tr>
<tr>
<td>PCS-500-15</td>
<td>Two-sided mount for the Nikon 200/300 and TE 200/300</td>
</tr>
<tr>
<td>PCS-500-16A</td>
<td>Mount for Zeiss Axiovert 100 with Side Brackets</td>
</tr>
<tr>
<td>PCS-500-17</td>
<td>Mount for Olympus IX50/IX70</td>
</tr>
<tr>
<td>PCS-500-18</td>
<td>Mount for Leica DMIRB/E</td>
</tr>
<tr>
<td>PCS-500-19</td>
<td>Mount for Zeiss Axiovert 25</td>
</tr>
<tr>
<td>PCS-500-20</td>
<td>Mount for Zeiss Axiovert 200</td>
</tr>
<tr>
<td>PCS-500-21</td>
<td>Mount for the Nikon Diaphot 2000</td>
</tr>
<tr>
<td>PCS-500-22</td>
<td>Two-sided mount for Nikon Diaphot 2000</td>
</tr>
</tbody>
</table>

Other microscope mounts continue to be added to this list, as new models are introduced. If your microscope is not included, please consult your representative.

3.1.2. Universal Post and Platform Mount (Optional)

The Post and Platform is available as an alternative to the microscope.
mounts. This is a universal solution and particularly useful for upright microscopes. It can be secured to the top surface of the isolation table either directly or via a magnetic base.

Two options are available:

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCS-500-MD11</td>
<td>Universal Post and Platform with Magnetic Base</td>
</tr>
<tr>
<td>PCS-500-MD12</td>
<td>Universal Post and Platform without Magnetic Base</td>
</tr>
</tbody>
</table>

Please note that because the post is mounted separately from the microscope, it is important for the microscope to be rigidly mounted to the same surface as the post mount. This may require modification to the microscope, for example, removing the rubber feet, and/or clamping the microscope to the base plate. If this is not carried out then the two items may move in relation to one another and drift may be apparent.

3.2. Mounting the LBM-7 Manual manipulator to your Microscope Mount

The LBM-7 Manual manipulator is compatible with both metric and imperial sized through patterned holed mounts.

3.3. Configuring the LBM-7 Manual manipulator

The symmetrical design of the LBM-7 Manual manipulator makes it easy to configure for right-sided operation (Section 3.3.1) or left-sided operation (Section 3.3.2) without the need for any adapter kits.

CAUTION: Do not tighten, loosen or remove any of the bearing adjustment screws on the side of each stage otherwise the manipulator will need to be returned to Scientifica for adjustment or reassembly. This is not covered under warranty.

3.3.1. Right Sided Operation

When shipped, the LBM-7 Manual manipulator is configured for right-sided operation. To convert a LBM-7 Manual manipulator to left-sided operation, please follow the instructions in 3.3.2
3.3.2. **Left Sided Operation**

To reconfigure the LBM-7 Manual manipulator for left-sided operation:

- If the Manipulator is already configured for right-sided operation, remove any items attached (e.g. pipette, stimulation electrode etc). Detach the manipulator from microscope mount and mounting adapter plate (Section 3.1).

- Carefully turn the manipulator upside down so that the base of the manipulator is visible.  (Fig. 1)

- Insert the 5mm allen wrench into the centre hole and use it to unscrew (turn anticlockwise) the M5 screw holding the X and Y stages together (Fig. 2). This screw is captured and so will not be able to be removed.

- The manipulator can now be divided into two pieces with Y, Z and approach axes forming one piece (Fig. 3) and the X axis and base rotary stage forming the other (Fig. 4). Due to the tight manufacturing tolerances during, these parts may be quite stiff to pull apart but will separate once the allen bolt has been unscrewed.
- Using the 2mm allen wrench loosen both of the recessed grub screws, one on either end of the black base (Fig. 5). These grub screws set a mechanical stop located within the base of the manipulator. Only one of these grub screws is needed to set the mechanical stop depending on which is easiest to access.

Loosen the base rotary stage by pushing the lever on the base of the manipulator to the left (Fig. 6). This will allow the stage to be rotated through 180° so that it is repositioned on the left hand side (Fig. 7).

Reassemble the two pieces of the manipulator together using the 5mm allen wrench. To aid alignment and make sure that the X & Y axes are at ninety degrees to each other, there is a male and female square area milled in to the X and Y stages.

Finally, release the approach axis using the 5mm allen wrench (Fig. 9) and rotate it through 90 degrees so that the manual adjuster is repositioned on the left hand side (Fig. 10).
3.4 Mounting a Pipette

The LBM-7 Manual manipulator comes with a custom built ‘probe clamping assembly’. This allows a holder with a diameter of up to 10 mm to be mounted.

3.3.3. Accessing the V groove for mounting or removing a rod based holder.
At the end of the assembly is a recessed M3 allen bolt (Fig. 13). Using the 2 mm allen key provided loosen the spring assembly to give the required amount of access. Insert your rod based holder and tighten the allen screw until the rod is securely clamped.

3.3.4. Setting the angle and repeatable rotation.
The clamping assembly has been designed so that it is possible to maintain the approach angle (independent to the angle selected on the approach axis) by setting a repeatable stop. This allows easy interchange of the pipette (or similar device) as the whole assembly can be rotated upwards and then, relocated back to its original position when finished. This can be done by releasing the black thumbscrew on the front of the assembly which clamps it to the approach axis stage (Fig. 14).
To change the position of the repeatable stop, use the 2mm allen wrench supplied to slightly loosen the grub screws located on either side of the approach axis stage. It is only necessary to tighten the most convenient upper grub screw. This allows a trapped insert which has a 180 degree slot cut into it to rotate freely (Fig. 12). The home position is achieved by a metal pin that protrudes from the back of the clamping assembly coming to rest at either end of this slot (Fig. 13). Simply rotate the assembly to the position that you require. When you have found your desired position, rotate the assembly anticlockwise for a full turn. This engages the insert which sets the repeatable stop. Once back to the original position, tighten the black thumbscrew, as any additional movements to the assembly will alter the position of the insert. Finally, tighten the grub screw on the side of the approach axis stage to lock the position of the trapped insert.

3.4. Mounting an extension bracket (Optional)

An optional extension bracket is available for the LBM-7 Manual manipulator. This is useful for those trying to achieve either a very shallow or very steep approach angle. Similarly it can be used when access does not allow the manipulator to be mounted close enough to the preparation. When this is ordered, you will be supplied with:

Extension Bracket Accessory Kit:

**Screws:**

M3 x 10 mm (Qty:1)
M4 x 8mm (Qty:1)

**Allen Wrenches**

2mm (Qty:1)
2.5mm (Qty:1)
3mm (Qty:1)
The extension bracket is shaped like a dumbbell and is 116 mm long. At one end there is a trapped insert as in the approach axis stage (see Fig. 12 in 3.4 above). The other end mimics the back of the probe clamping assembly and slots into the trapped insert on the approach axis stage.

![Front and Back Views of the Extension Bracket](Fig. 15)

Use the M4x8mm and M3x10mm screws, and 2.5mm and 3mm allen keys, provided, to mount this end of the extension bracket to the two threaded holes in the trapped insert on the approach axis. Rotate the extension bracket to the desired angle by releasing the grub screw on the sides of the approach axis stage to adjust the position of the trapped insert. (see 3.4.2 above)

![Mounting the Probe Clamping Assembly](Fig. 16)

Mount the probe clamping assembly to the other end of the extension bracket. Ensure the metal pin on the back of the probe clamping assembly slots into the 180 degree slot in the trapped insert. When the probe clamping assembly is mounted to the approach axis, the clamping assembly can now be set to an angle independent from that of the extension bracket. Release the grub screw on the top of the extension bracket using the 2mm allen key and follow the instructions in 3.4.2. above to set the clamping assembly to your desired angle and lock the repeatable stop.

![View of the Mounted Assembly](Fig. 17)
3.6 Mounting an L-shaped Bracket (Optional)

An optional L-shaped bracket is available for the LBM-7 Manual Manipulator. This bracket allows heavy loads to be mounted and repositioning of the approach axis, thus increasing the versatility of the manipulator.

NB. When using the L-shaped Bracket, movement from the z-axis will be unavailable.

When this is ordered, you will be supplied with:

L-shaped Bracket Accessory Kit:

- M4 x 10mm Screw (Qty: 4)
- M6 x 10mm Screw (Qty: 1)
- 3mm Allen Key (Qty: 1)
- M6 washer (Qty: 1)

The L-shaped Bracket is 97mm long and 77mm high. It can be attached to the body of the manipulator by either end. (Fig. 20)

Use the 5mm allen key and unscrew the M5 bolt at the back of the manipulator.
This will release the approach axis assembly and reveal the four threaded holes on the main body of the manipulator (Fig. 22). Use the M4 x 10mm screws and 3mm allen key, provided, and attach the bracket in the desired orientation.

Use the M5 screw and the washer provided to bolt the approach axis to the desired hole of the L-shaped bracket (Fig. 23).

3.7 Mounting a Sliding Bracket (Optional)

An optional sliding bracket is available for the LBM-7 Manual Manipulator. The Sliding Bracket, with 75mm of sliding travel and featuring mechanical stops gives easy and rapid pipette exchange with assured repeatability. When this is ordered, you will be supplied with:

Sliding Bracket Accessory Kit:

Screws:

- M5 x 10mm screw (Qty: 2)
- M4 x 10mm screw (Qty: 1)
- M3 x 10mm screw (Qty: 1)
Allen Wrenches:

4mm allen key (Qty: 1)
3mm allen key (Qty: 1)
2.5mm allen key (Qty: 1)

The sliding bracket guide is rectangular and is 125mm in length and 29mm in width. This is bolted to the approach axis and the probe clamping assembly is attached to the carriage.

Using the 2.5mm allen key, provided, remove both blanking grub screws from the approach axis (Fig. 25). Align the four holes of the sliding bracket to the threaded holes on the approach axis. Loosen the trapped insert. By releasing the two grub screws on the approach axis, it allows the insert to rotate freely.

Bolt the sliding bracket to the approach axis with the screws and allen keys as in Fig. 25 and then mount the probe clamping assembly to carriage.

There are threaded holes at intervals along the body of the sliding bracket into which can be inserted M3 screws for adjustable mechanical stops.
When it is mounted to the approach axis, the probe clamping assembly can be set to an angle independent from that of the sliding bracket. Follow the instructions in 3.4.2 above to set the clamping assembly to your desired angle and lock the repeatable stop.

3.8 Inchworm Motor Mounting Bracket

Designed specifically to mount the Burleigh Inchworm™, this bracket offers strength and stability for high precision Burleigh nanotechnology. The Inchworm Motor Mounting Bracket can be attached to the Sliding Bracket for enhanced versatility.

When this is ordered, you will be supplied with:

Inchworm Motor Mounting Bracket Kit:

**Inchworm Drive Fixture**

- M5 x 10mm screw (Qty: 2)
- M4 x 10mm screw (Qty: 1)
- M3 x 10mm screw (Qty: 1)

**For Sliding Carriage**

- M5 x 10mm screw (Qty: 2)
- M4 x 10mm screw (Qty: 1)
- M3 x 10mm screw (Qty: 1)

**Allen Keys:**

- 4mm allen key (Qty: 1)
- 3mm allen key (Qty: 1)
- 2.5mm allen key (Qty: 1)

The Inchworm Motor Mounting Bracket is 44mm x 30mm x 50mm. The Inchworm Bracket can be bolted to the approach axis or the sliding bracket.

Using the 2.5mm allen key, provided, remove both blanking grub screws from the approach axis, as in slide Fig. 28 and align the four holes of the mounting bracket to the threaded holes on the approach axis, adjusting the trapped insert if necessary (Fig. 29)
The Inchworm Motor can be inserted into the mounting bracket and locked into place by tightening the grub screw on the under side of the bracket. (Fig. 30)

To fit the Inchworm Motor and Mounting Bracket onto the Sliding Bracket, (Fig. 31) Attach the sliding bracket to the manipulator as shown in 3.7, then instead of attaching the probe assembly clamp, bolt the Inchworm Motor Mounting Bracket to the Sliding Bracket in exactly the same manner as to the approach axis in 3.8.

Follow the instructions in 3.4.2 above to set the clamping assembly to your desired angle and lock the repeatable stop.
3.9 Fitting the Extra Smooth Adjusters (Optional)

The Extra Smooth Adjusters have twice the diameter of the standard adjusters giving an extra smooth action which in turn gives the user more control, increased sensitivity and higher resolution. They are interchangeable with the standard adjusters. When this is ordered, you will be supplied with:

Extra Smooth Adjuster Kit:

Extra Smooth Adjusters

- 46mm x 0.8mm per revolution thread pitch for the x-axis (Qty: 1)
- 38mm x 0.8mm per revolution thread pitch for the y-axis (Qty: 1)
- 28mm x 0.8mm per revolution thread pitch for the z-axis (Qty: 1)
- 38mm x 0.5mm per revolution thread pitch for the approach axis (Qty: 1)
- 2mm Allen Key (Qty: 1)
Although they are all slightly different, the Extra Smooth Adjusters are fitted in the same way.

Locking each adjuster in place is an M3 grub screw, using 2mm allen key (Fig. 34), loosen the grub screw, taking care as the adjuster may spring out. Remove the standard adjuster and insert the appropriate Extra Smooth Adjuster in the cavity and while holding linear axis, push the adjuster into the cavity (Fig. 35) until the top of the collar is level with sleeve and tighten grub screw (Fig. 36). Repeat for the other three axis.
4. OPERATION

4.1. Adjusting the Approach Angle

It is possible to set the approach axis to a wide selection of angles.

To change the angle:

- Loosen the M6 screw which holds the approach and vertical axes together using the 5mm allen wrench. This M6 screw is located on the back of the vertical axis (Fig. 37)
- Reposition the approach axis angle as desired.
- Retighten the M6 screw to secure the position using 5mm allen key.

4.2. Changing Pipettes

The base rotary stage and probe clamping assembly (section 3.4) greatly simplifies the pipette exchange procedure. The base rotary stage allows the entire manipulator to be rotated on the horizontal plane for easier
access to the pipette holder. The rotation of the clamping assembly allows the pipette holder to be removed and the pipette changed whilst the axial position is maintained (section 3.4). After a new pipette is installed the manipulator can be rotated back to a precise and repeatable position.

To operate the base rotary stage:

- Push the base rotary lever to the left to unlock the stage.

- Rotate the whole manipulator forwards for easier access to pipette holder.

- After a new pipette has been installed, rotate the manipulator back and until it comes up against the adjustable stop (section 4.3). Relock in position by pushing base rotary lever to the right.

4.3. Setting the Adjustable Stop (in base rotary stage)

The base rotary stage consists of two hidden spigots on a circular annulus (which act as adjustable stops), which sits within the top of the black base of the manipulator. These spigots rotate within a hidden circular groove in the bottom of the X-axis stage. This means that when the base rotary lever is unlocked, the manipulator assembly can be freely rotated relative to the black base by up to 120 degrees. When the spigots hit each end of the groove, they are up against their end stops. Adjusting the position of the spigots, therefore adjusts the position of the two end stops. The grub screws on the two sides of the black base lock the position of these spigots in place, so that the manipulator can be rotated and returned back to a repeatable position. If these screws are unlocked, the circular annulus within the top of the black base is released, allowing the spigots/stops to be repositioned to suit and then locked in place.
To adjust the position of the stop.

1. Unlock the base rotary stage by rotating the base rotary lever to the left (section 4.2).

2. Release the grub (set) screws on the sides of the black base using the 1mm allen wrench (Fig. 41). Releasing this grub (set) screw unlocks the circular annulus and allows it to be rotated to adjust the position of the two spigots.

3. Rotate the manipulator until you can feel the spigot up against the end of the groove and its end stop. With the circular annulus released, rotate the manipulator until you have reached the desired position for the stop.

4. Now lock the position of the stop by retightening either of the grub (set) screws on the black base, whichever is more accessible depending on whether you have it configured for left or right sided use. This will secure the position of the two spigots forming the stop.
5. MAINTENANCE AND SERVICE

The LBM-7 Manual manipulator has been designed to be stable and for long term use. In the unlikely event of foreign material entering the drive mechanism, it is recommended that the system be returned to your local representative or Scientifica in the UK for servicing. **The user is strongly recommended against self disassembly of the stages.** Doing so will invalidate the 12 month warranty that comes with this product.

If the system is not functioning correctly, please refer to the trouble shooting guide below to identify possible causes of problems. If this guide is not successful, please contact the Scientifica Customer Service Department in the UK or your local representative.

5.1. Troubleshooting

Problem: Excess motion of pipette tip during manual adjustment

*Typical Symptoms:*

- Excess or erratic motion of pipette tip during manual adjustment.
- Pipette sensitive to vibration

*Probable Causes:* Generally instability is caused by loose mechanical connections or dirt/debris between the mating surfaces.

*What to check:*

**Manipulator and Linear Stages**

- Check that the following screws are tight:
  - Locking screw on approach axis and base rotary stage lever.
  - Screws holding rotary pivot/clamping assembly to approach axis.
  - Screws holding linear stages to each other.
  - Screws holding manipulator to mounting system.
- Check that mating surfaces between the Linear Stages, and the mounting system are free of dirt, debris and burrs.
Mounting System

- Check that the mounting system is stable
- Check that all screws are tight
- Check that mating surfaces are free of dirt, debris, and burrs.
- Check that the mounting system is rigid enough to support the LBM-7 Manual manipulator.
- Refer to Section 3.1 for recommended mounting systems
- Refer to the installation instructions for the PCS-500 Series or equivalent Microscope Mounts

NOTE: In cases where the Manipulator is not attached directly to the microscope, it is important that the microscope itself is stable. The microscope and the mount holding the manipulator must both be rigidly attached to the same baseplate or optical table. This may mean a modification to the microscope, for example, removing the rubber feet and/or providing some way to clamp it to the baseplate. Refer to Section 3.1 for recommendations.

Problem: Drift

Typical Symptoms:

- Pipette tip moving after manual adjustments are completed.

Also refer to the Troubleshooting Section on Excess motion of pipette tip during manual adjustment.

Probable Causes: Thermal drift is usually caused by thermal changes in the lab environment. The most thermally sensitive components are the headstage (if used), the pipette holder and pipette itself. If the manipulator is not mounted directly to the microscope, then the mounting system may also contribute to drift.

What to check:

- Check that the system (mount and microscope) is protected from drafts
- Check for heat sources near the system (for example: power supplies, heaters, lamps, sunlight)
- Check for ambient temperature changes during the experiment,
### 6. SPECIFICATIONS

**LBM-7 Manual manipulator Assembly**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colour:</td>
<td>Blue</td>
</tr>
<tr>
<td>Number of Axes:</td>
<td>4 Linear Axes</td>
</tr>
<tr>
<td></td>
<td>3 Rotary Axes (one horizontal and two vertical)</td>
</tr>
<tr>
<td>Range of Motion:</td>
<td></td>
</tr>
<tr>
<td>X, Z and approach axes</td>
<td>25mm</td>
</tr>
<tr>
<td>Y axis</td>
<td>12.7mm</td>
</tr>
<tr>
<td>Thread Pitch on adjusters (standard):</td>
<td></td>
</tr>
<tr>
<td>XY and Z axes</td>
<td>0.8 mm per revolution</td>
</tr>
<tr>
<td>Approach axis</td>
<td>0.5 mm per revolution</td>
</tr>
<tr>
<td>Type of Stages bearing races</td>
<td>Aluminium stages with prestressed linear ball</td>
</tr>
<tr>
<td>Weight</td>
<td>Approximately 1Kg (precise weight to be confirmed)</td>
</tr>
<tr>
<td>Country of manufacture</td>
<td>UK</td>
</tr>
</tbody>
</table>
7. DIMENSIONAL DRAWINGS
8. WARRANTY

The LBM-7 Manual manipulator is warranted against defects in material and workmanship for a period of one year after date of delivery. During the warranty period, Scientifica Ltd will repair or, at its option, replace parts which prove defective when the instrument is returned to Scientifica Ltd in the UK or your local representative.

Before return of an instrument, please obtain a returns authorisation number (RA) from your local representative or Scientifica Ltd in the UK. The warranty will not apply if the instrument has been damaged by accident, misuse, or as a result of modification by persons other than Scientifica Ltd personnel.

The liability of Scientifica Ltd in the UK, (except as to title) arising out of supplying of the said product, or its use, whether under the foregoing warranty, a claim of negligence, or otherwise, shall not in any case exceed the cost of correcting defects in the products as herein provided. Upon expiration of the warranty period specified herein, all liability shall terminate. The foregoing shall constitute the sole remedy of the buyer. In no event shall the seller be liable for consequential or special damages.

Scientifica Ltd

Kingfisher Court
Brambleside
Bellbrook Industrial Estate
Uckfield
East Sussex
TN22 1QQ