



LUMEN 200/200S

Metal Halide Illumination systems
Manual Version 2.4



Worldwide distribution



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Thank you for choosing to purchase a Lumen 200 from Prior Scientific. We hope that you find this product useful, reliable and a valuable addition to your microscopy system.

Please do take the time to read this manual thoroughly before starting to use the product. The manual contains important safety information, as well as showing how to set up and operate the device correctly.

We trust you will find using the product both simple to do and trouble free, but if you experience any problems, please do not hesitate to contact us.

To find out more about Prior, and the products we offer to make microscopy more efficient, precise and above all more rewarding, visit www.prior.com or contact your local sales office.

IMPORTANT SAFETY INFORMATION

SECTION I

I.1 Safety warnings

SAFETY WARNINGS - Always observe the following safety precautions:

This symbol, used on the LED units and in this manual, means: Caution! Pay particular attention to sections containing this symbol!



Before using the illumination system, please follow and adhere to all warnings, safety and operating instructions located on the product and in this User Manual. Contact Prior before using this product in a manner not specified in the manual. Retain this manual for future reference as it contains important safety and operational information.

- **When switched on this product **MUST ALWAYS** be accompanied by a qualified operator. When switched on it should **NEVER** be unattended!**
- **Do not expose the product to water or moisture.**
- **Do not expose the product to extreme hot or cold temperatures.**
- **Do not expose the product to open flames.**
- **Do not allow objects to fall on or liquids to spill on the product.**



- Do not position the equipment so that it is difficult to operate the associated mains isolation device.
- All of the Lumen variants are class I and must only be connected to a power outlet which provides a protective earth (ground).
- **DANGER** – Never alter the AC cord or plug. The power cord set must be an appropriately rated and approved cord set in accordance in the regulations of the country it is used in. If the supplied plug adapter is not the correct fitting for your geographic area or if you are unsure about the relevant regulations, please contact your supplier for advice
- The appropriate fuse rating for all Lumen Instruments is F5AH250V.
- Connect the AC power cord only to designated power sources as marked on the product.
- Make sure the electrical cord is located so that it will not be subject to damage.
- Always disconnect power from product **BEFORE** removing, changing, or adding components.
- Do not in any way attempt to tamper with the product, doing so will void the warranty, and may damage the system. This product does not contain consumer serviceable components, all repairs or services should be performed by **Authorised Service Centres**, contact your local dealer for details.



- Ensure that the ventilations slots in the controller case are free from blockages.
- **WARNING: - Hg-LAMP CONTAINS MERCURY, Manage in Accord with Disposal Laws. The method in which the lamps are disposed of must comply with the local rules & regulations for disposal of hazardous materials. Lamps may be return to Prior Scientific providing they are return in their original packaging. SEE SECTION 7.3 FOR INFORMATION ON WHAT TO DO IF A BULB BREAKS!**
- Before replacing a fuse, **DISCONNECT THE EQUIPMENT FROM THE MAINS SUPPLY.**
- Ensure that the mains switch / IEC socket/ mains plug is easily accessible to allow the unit to be switched off.
- **EYE DAMAGE MAY RESULT FROM DIRECTLY VIEWING THE LIGHT PRODUCED BY THE LAMP USED IN THIS PRODUCT.**
- Always make sure the light guide is properly inserted into the collimator which is firmly attached to the microscope using the adaptor provided and into the Lumen 200/Pro, before turning on the power to the unit.
- **NEVER LOOK INTO THE EMITTING END OF A LIGHT GUIDE.**
The light could severely damage the cornea and retina of the eye if the light is observed directly.



- **Appropriate eye shielding must be used at all times; clothing should be used to protect exposed skin.**
- **NEVER PLACE THE END OF AN EMITTING LIGHT GUIDE NEAR SKIN AS THIS MAY RESULT IN BURNING AND DAMAGE TO THE SKIN.**
- **NEVER PLACE THE END OF AN EMITTING LIGHT GUIDE NEAR A FLAMMABLE SUBSTRATE AS SUFFICIENT POWER IS EMITTED FROM THE LIGHT GUIDE TO IGNITE FLAMMABLE SUBSTANCES**

- **Surface may be hot!**



- **Be aware that this unit may emit UV radiation**



1.2 Shipping/Storage precautions

- **NEVER SHIP THE UNIT WITH THE BULB INSTALLED.**
- Always use the original packaging for shipping and storing purposes.

Unpacking and Inspection

- Carefully unpack the unit and retain packaging to return equipment for servicing.
- If the equipment appears damaged in any way, return it to sales outlet in its original packaging. No responsibility for damage arising from the use of non-approved packaging will be accepted. Ensure all items and accessories specified are present. If not contact your local sales outlet.



1.3 Models covered by this manual

Prior Scientific produces both the L200 and the L200S models of metal halide bulbs.

Please note that when instructions refer to a 'L200' or 'Lumen 200' the same will also apply to the L200S unless otherwise specified. This is to avoid repetition and reduce the manual's size.

Bulbs with extended spectral ranges are available – these are identified by the designation '210' or '220' rather than '200'. For the purposes of this manual, a L210 or a L220 is identical to a L200, and a L210S or a L220S is identical to a L200S.

Formerly, Prior Scientific manufactured the L200Pro, the L210Pro and the L220Pro. These are no longer available from Prior Scientific and so have been removed from this manual. Consult Prior Scientific for more information on these models.

PRODUCT INFORMATION

SECTION 2

2.1 General Specifications

Lumen200 /S Specification. Power: Universal integral Power Supply: Input 110-250V, 50/60Hz,

Use within ambient temperature range: +5 - +30 °C.

Required clearance: 100mm minimum.

The two different types of the Lumen 200 contain different components. Before starting to assemble and use your system, check that ALL of the components are present. If they are not, contact the supplier immediately.

2.2 Lumen 200

The Lumen 200 is a stand-alone standard unit and is furnished with a manual 6 position shutter, (0, 10, 25, 50, 75, and 100%). The Lumen 200 contains a 200 Watt Metal halide bulb which is cooled. The bulb is self-aligning and is coupled via special optics to the liquid light guide, which transfers the light to the microscope. For each major make of microscope an adaptor is available to connect the liquid light guide to the microscope.

Lumen 200 Standard Contents:

Lumen 200, Liquid Light Guide, Adaptor for specific microscope, Lumen 200 Bulb, Power Cord, Hex key.

2.3 Lumen 200S

The Lumen200S version of the Lumen series contains an integrated high speed shutter that can be controlled via the shutters ports of the Prior ProScan controllers, USB, RS232 or TTL. It can also operate as a stand-alone standard unit and is furnished with a manual 6 position shutter, (0, 10, 25, 50, 75, and 100%). The Lumen200S contains a 200 Watt Metal halide bulb which is cooled. The bulb is self-aligning and is coupled via special optics to the liquid light guide, which transfers the light to the microscope. For each major make of microscope an adaptor is available to connect the liquid light guide to the microscope.

Lumen 200S Standard Contents:

Lumen 200S, Liquid Light Guide, Adaptor for specific microscope, Lumen 200 Bulb, Power Cord, Shutter cable, RS-232 cable, USB cable, Hex key.

2.4 Liquid Light Guide

Liquid light guides have a limited lifetime, independently of whether they are stored or in use. However, lifetime may vary depending on climatic conditions. Cold and humid environments will extend lifetime, hot and/or dry environments will shorten it. Though the outstanding UV performance will not markedly degrade during usage, we recommend that the light guide is replaced in advance of the expected lifetime of expiration. Final degradation is generally caused by the formation of bubbles in the liquid, and optical output may then drop very rapidly.

Approximate lifetime: 4 years

Suggested replacement time: 3 years

Figures based on 23°C and 60% RH.

General usage temperature range: +5°C - +30°C

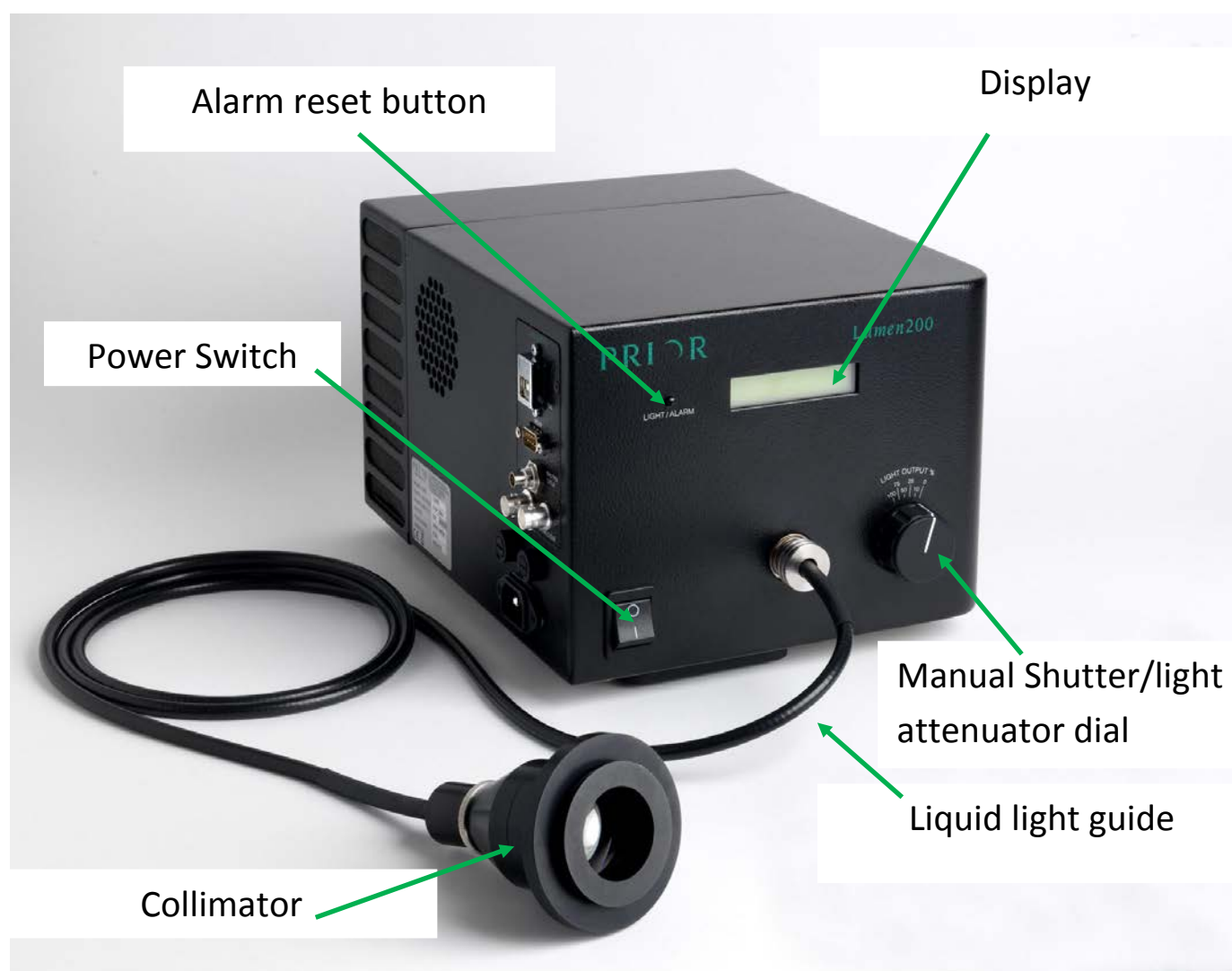
Should the temperature limits be exceeded the likely damage is the formation of bubbles inside the liquid. These may be reabsorbed if the light guide is stored at room temperature for several days.

GETTING STARTED

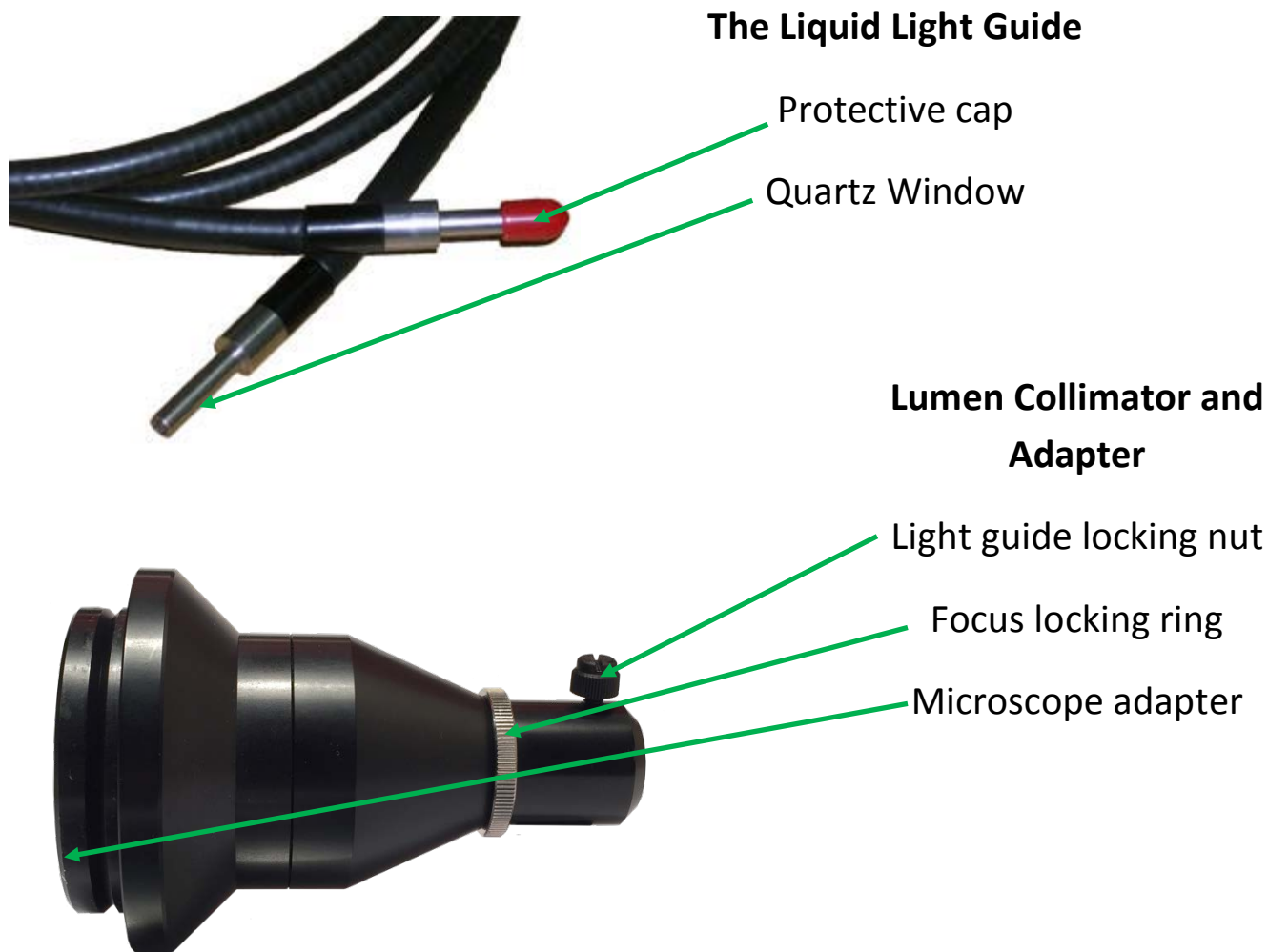
SECTION 3

3.1 Diagrams

Before starting it is advisable to get to know the device.



The Lumen 200



3.2 Installing the system

3.2.1 – Installing the bulb

Required equipment – Lumen 200, Hex Key, Prior LM375 Bulb

Only use Prior bulbs otherwise damage to the unit may result.

Do NOT touch the inside of the reflector of the bulb

The bulb is delicate and must be handled with care.

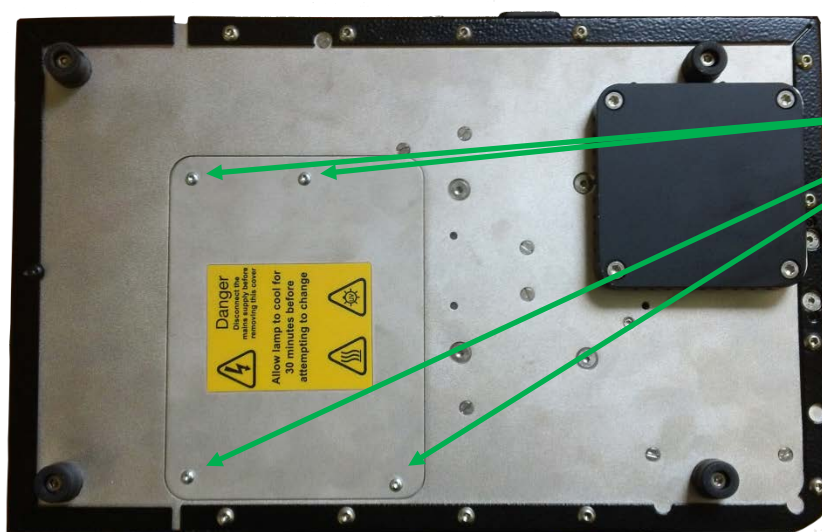


Make sure the unit is not connected to the power supply; and if the unit has been previously switched on, allow 30 minutes for the bulb to cool before commencing the process.



Find a flat surface and place the Lumen 200 upside down on the surface

Unscrew the four hex screws and remove the panel.



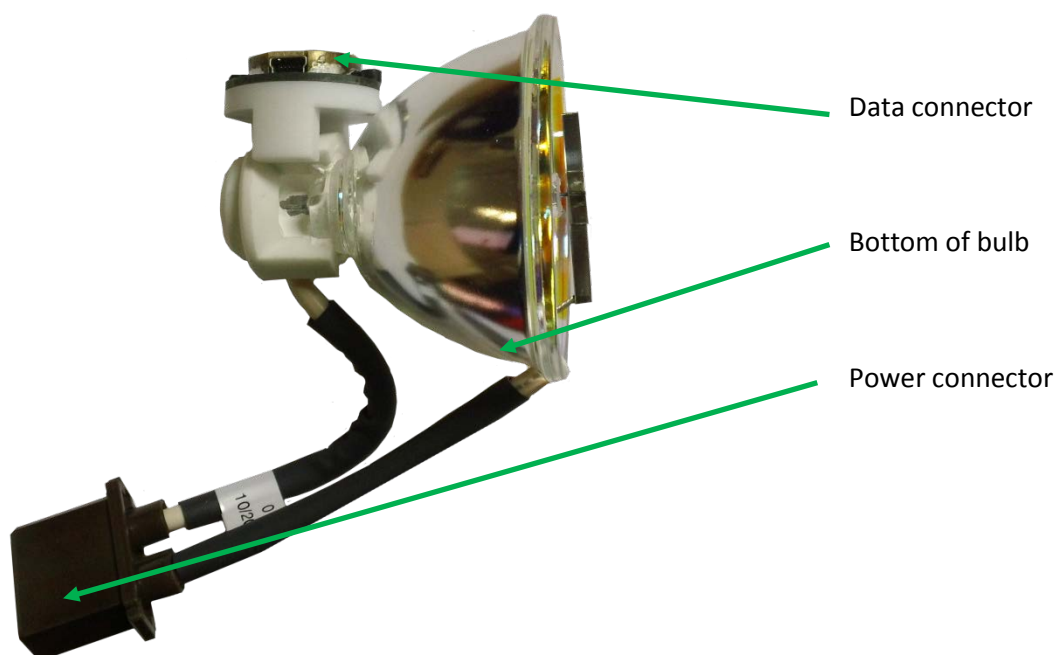
Four hex screws

Open the top of the bulb carton.

Remove V shaped Cardboard holder

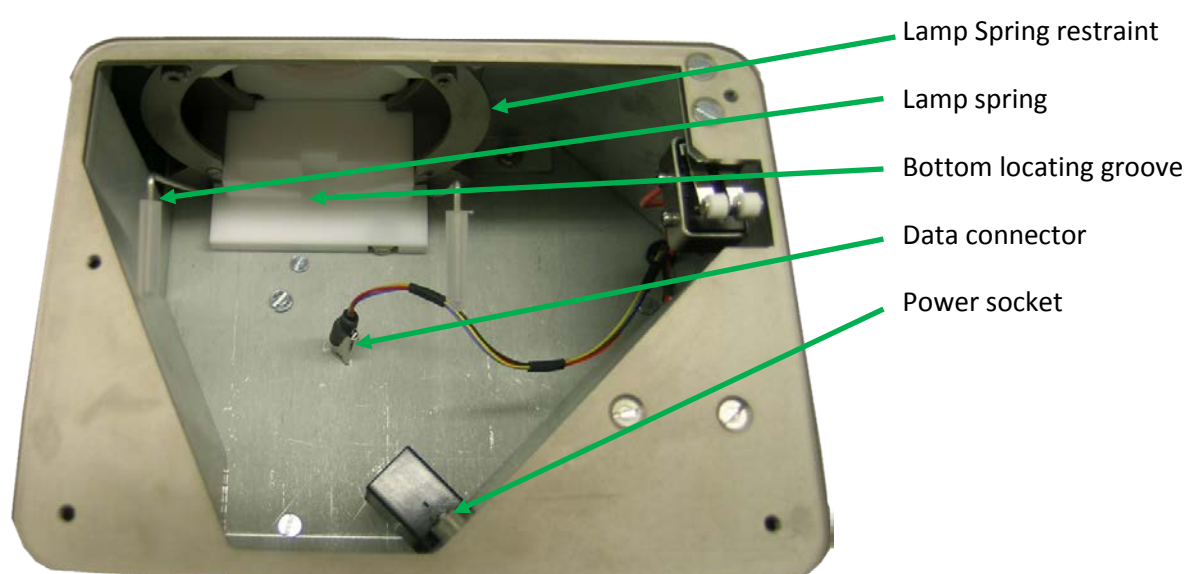
Push cardboard flaps back

Lift bulb out of carton and turn the bulb so that the cables and connector hang down in the bulb chamber. Plug the brown connector in the bulb into the power socket in the bulb housing – ensure it is firmly pushed into position.



This will orientate the bulb with the printed circuit board and data connector socket facing upwards.

Place the bottom of the bulb into the groove at the bottom of the lamp housing. Lift the spring towards the bulb; which will click the bulb into position. Ensure that the springs end up attached to the spring restrains, located above the springs. This will hold the bulb firmly in place.



The data connector cable should be plugged into its socket on the printed circuit board (located atop the bulb!).

Replace the bulb housing cover and replace the four hex screws.

3.2.2 Connecting to the Microscope

Once the bulb is installed the Lumen 200 can be connected to the microscope.

Place the Lumen 200 in a safe position where none of the fan outputs are obstructed.

Unpack the liquid light guide from the oil packaging and remove both plastic caps from the light guide. It is important to remove the caps before connecting to the light guide to avoid damage on power up.

Unscrew the connector on the front of the Lumen 200 and insert the light guide.

Ensure the light guide is fully inserted into the Lumen 200; it should be inserted 58 mm into the Lumen 200. Tighten the connector unit until resistance is felt; the guide is now firmly held in the Lumen 200 connector.

Locate the collimating lens supplied to attach the light guide onto the microscope, loosen the screw on the back of the collimating lens. Firmly push the light guide into the hole, ensure it has reached the end, stop and tighten the screw.

The Lumen is supplied with a collimating lens specifically designed to fit your microscope. The supplied collimating lens will only fit that type of microscope. Contact your supplier immediately if this is incorrect.

The illumination can be optimised by focussing the beam by adjusting the distance between the fibre tip and the microscope by unscrewing the collimator. The silver locking ring can then be used to fix the collimator into the optimum position.

3.3 Starting up the Lumen 200

Do not power up the Lumen 200 without the light guide attached to both the Lumen 200 and microscope. Only power up the Lumen 200 when it is installed on a level surface.



Ensure the light guide is attached to both the Lumen 200 and microscope.

Connect the power cable to the Lumen 200 and switch the Lumen 200 on.

Allow at least five minutes for the light to reach operational temperature.

Do not switch off the unit within ten minutes of power up as this may reduce the lifetime of the bulb. Do not power up until at least ten minutes has elapsed since it was shut down.

3.4 Working with the Lumen 200

The Lumen 200 is a manual light source. Attenuation of the light can be achieved by use of the manual shutter control knob on the front of the unit. Illumination can be set to 0%, 10%, 25%, 50%, 75% or 100%. Turning the knob to the left increases the intensity; turning to the right decreases intensity.

3.5 Shutting down the Lumen 200

The Lumen 200 should not be shut down after at least ten minutes has elapsed since the unit was powered up.

Likewise, it should not be powered up within ten minutes of being switched off.



3.6 When to change the bulb

The Lumen 200 bulb is installed with a timer chip which counts the hours that the bulb currently installed has been switched on. Once it reaches the recommended lifetime of 2000 hours, an alarm will sound on the Lumen 200. It is highly recommended that the bulb be changed at this point. This alarm can be silenced using the button situated to the left of the display panel on the front of the lumen. Once a bulb has reached 2000 hours the alarm will sound on power up of the Lumen 200 until the bulb is changed. After 2500 hours the bulb will no longer light.

Please note that the display records hours and minutes of use up to one hundred hours. After this point, the display will change to display hours of use only. In addition, an hour is added to the timer each time the unit is switched on or off, as repeated on/off cycles reduce the life of the bulb.

LUMEN 200S

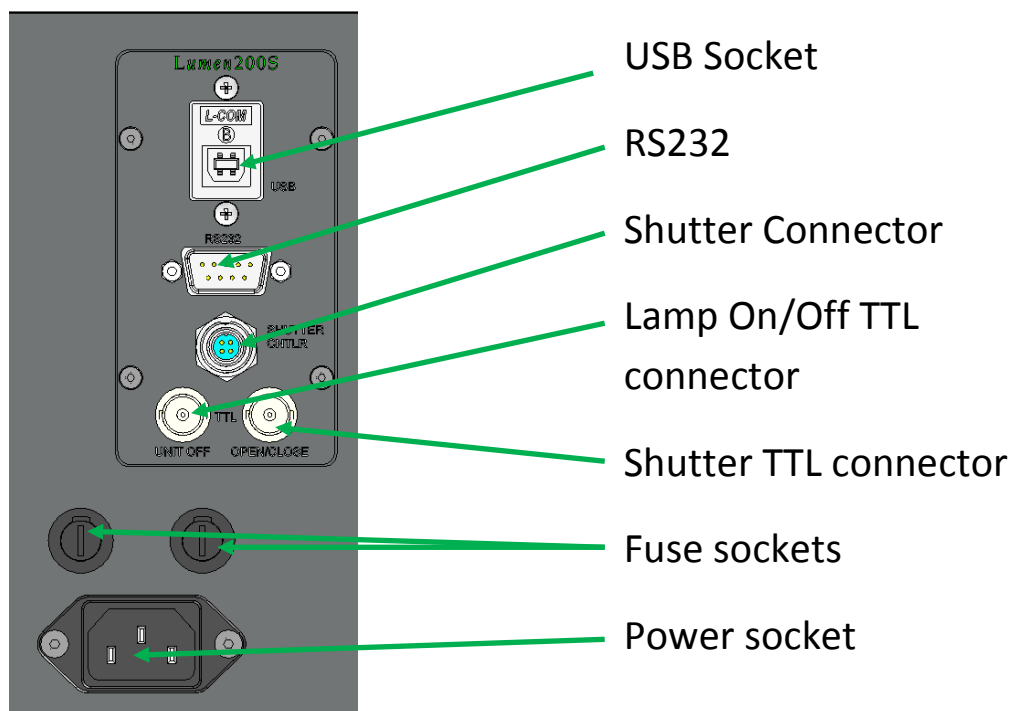
SECTION 4

4.1 The Lumen 200S

The Lumen 200S is highly similar to the Lumen 200 and much of what has been described previously will be relevant. Therefore this section will focus purely on those features that are unique to the Lumen 200.

BEFORE USING THE LUMEN 200S PLEASE READ THE SECTION ON THE LUMEN 200 TO UNDERSTAND THE BASIC OPERATING INSTRUCTIONS.

The main difference is the fact that the Lumen 200S has an electronically controlled shutter. On the side panel of the Lumen 200S can be found connections for USB, RS232 , shutter and TTL connectors. These are clearly labelled. The TTL connector labelled as 'OPEN/CLOSE' is the shutter TTL connector, and the Lamp on/off TTL connector switches the lamp on and off.



4.2 Connecting the Lumen 200S to a computer using third party software.

The Lumen 200s can be controlled directly from a PC without the need for a ProScan controller . The Lumen 200S will emulate a Prior ProScan controller with one shutter connected and can be set up in third party software this way. The PC connector can be detected via either a USB or RS232 cable. The USB cable may require a driver which can be downloaded from our website.

If using Windows 7, connecting the Lumen 200S is likely to be a simple matter of simply inserting the cable; the driver software should automatically install. If using an older version of Windows please consult Prior Scientific for advice.

4.3 Connecting the Lumen 200S to a ProScan system

Assuming you have an active shutter connection the Lumen 200S can be used with a ProScan system. The Lumen 200S is controllable via Prior Terminal, which is downloadable from www.prior-scientific.co.uk/Customer-Support/Download-Centre.

For more advice on using this software, please consult Prior Scientific.

The shutter controller connectors on the Lumen 200S and the ProScan controller should be connected using the cables provided. It isn't important which shutter port is used, but this should be noted if one wants to use a command set, or integrate the system into third party software.

4.4 Working with the Lumen 200S

The Lumen 200S can be used either as a standalone unit, controlled via a PC, or controlled by a PC via a ProScan controller with a shutter connector. The condition of the shutter is indicated on the display panel on the front of the device, along with the bulb time in hours. O = Shutter open, S = shutter closed.

4.4.1 Using the Lumen 200S as a standalone light source.

By default the Lumen 200S starts with the motorised shutter in the open position – the shutter can be heard opening when the unit is started. If the unit is used as a standalone device then light intensity can be controlled manually with the control knob as is the case with the Lumen 200.

4.4.2 Using the Lumen 200S with a PC

The Lumen 20S shutter can be controlled via a PC using either USB, RS232 or TTL connectors. It is treated in your software as a ProScan controller with just one controller – refer to your software manual if you are controlling the Lumen 200S with third party software. RS232 commands are also available if the Lumen 200S is directly connected to the computer – see section 4.5. Intensity can only be set using the manual shutter control knob on the front of the unit.

4.4.3 Using a Lumen200S with PC and a ProScan controller.

The Lumen 200S shutter can be controlled via a ProScan controller. Connect the Lumen 200S to the shutter port of the Prior controller using a standard Prior shutter cable. The Prior controller can be controlled via the PC with either a USB or RS232 connection. Again, note that intensity can only be set using the manual shutter control knob on the front of the unit.

4.4.4 Using a Lumen200S with TTL inputs

Two TTL inputs are available on the side panel of the Lumen200S.

The first of the TTL inputs can be used to OPEN or CLOSE the shutter. It uses 0V to 5 vdc, where LOW is used to OPEN the shutter and HIGH is to CLOSE the shutter. The second of the TTL inputs can be used to turn OFF the bulb only. It uses 0V to 5 vdc where LOW turns the bulb OFF. The TTL CANNOT be used to switch the bulb ON.

4.5 Command Set for Lumen 200S

Command	Argument	Response (All end with <cr>)	Description
?	None	Text string	Reports information about the peripherals currently connected to the controller. The information end is always a line saying END This allows for the addition of extra fields of information without effecting application software. Users should always read lines in until the END is seen. A typical response is from Lumen 200S shown below <pre> PROSCAN INFORMATION DSP_1 IS NOT FITTED DSP_2 IS 3 AXIS STEPPER VERSION 0.0 DRIVE CHIPS 111000 JOYSTICK NOT FITTED STAGE = NONE FOCUS = NONE FOURTH = NONE FILTER_1 = NONE FILTER_2 = NONE SHUTTERS = 001 LED = 0000 AUTOFOCUS = NONE VIDEO = NONE HARDWARE REV A END </pre>
VER	None	Text string	Returns the version of the code fitted to the unit. e.g. Lumen Shutter V2.5c
VERSION	None	Text string	Returns the Issue number. e.g. 025
BULBTIME	None	Text string	Returns the bulb lifetime as shown below; <pre> HOURS = 20 MINUTES = 30 END </pre> Showing bulb lifetime of 20 hours and 30 minutes.
UNIT	None	Text String	Returns the status of the Lumen200S <pre> UNIT = 1 UNIT = 0 END END For Bulb ON For Bulb OFF </pre>
UNIT	0	R	Turns the bulb OFF. It returns a response R on completion. NOTE:- The bulb can only be turned on again by turning the mains switch OFF and ON again.
8	S,C	R If shutter is not fitted E,20 will be returned	Opens or closes the shutter S If C is 0 the shutter is opened, If C is 1 the shutter is closed. eg 8,1,0 the shutter is closed
8	S	0,1	Returns the status of shutter S 0 the shutter is opened, 1 closed

8	s,c[,t]	R If shutter s is not fitted E,20 will be returned	Opens or closes the shutter s (value '1' '2' or '3'), if c is 0 the shutter is opened, 1 it is closed. The optional argument t is used to open/close the shutter for a time t milliseconds.
8	s	c If shutter s is not fitted E,20 will be returned	Returns status c of shutter s
Shutter	s	Text string	Prints information about shutter's' (s is a value between 1 and 3). The information end is always a line saying END. This allows for the addition of extra fields of information without effecting application software. Users should always read lines until the END is seen in order to maintain compatibility. Example SHUTTER_1 = NORMAL DEFAULT_STATE=CLOSED END SHUTTER_2=NONE END

TROUBLE SHOOTING

SECTION 5

The Lumen 200 should give you years of reliable and trouble free service. If something goes wrong please consult the table below or contact Prior if you are unsure. Do not undertake any repair work on your own; as this will void your warranty.

5.1 Alarms and warnings

Message: BULB FAULT I

Alarm reason: Software not recognising hr count from bulb

Quiet alarm?: No

Actions: Switch off unit, check bulb for damage and ensure data connector is securely inserted into its socket on the bulb's printed circuit board.

Message: OVER TEMPT FAULT

Alarm reason: Bulb over temperature

Quiet alarm?: Yes; hold button for 5-10s and reset to clear alarm

Actions: Check vents at rear of unit are not blocked or covered

Message: UNDER TEMP FAULT

Alarm reason: Bulb area under temperature

Quiet alarm?: No

Actions: Check unit is above five degrees centigrade. If this fault continues despite the temperature being greater than this contact Prior as the unit may be faulty.

Message: CHANGE BULB

Alarm reason: Bulb has reached 2000 hour lifetime limit

Quiet alarm: Yes, hold button for 5-10 seconds

Actions: Change bulb

5.2 Troubleshooting

Do not hesitate to contact Prior if you are unsure; if your problem is not covered here or if these suggestions do not help.

Problem: On initial startup, no light is emitted

Suggested Solutions:

- Confirm unit is plugged in and that all needed connections are firm. Ensure the liquid light guide is installed correctly.
- Confirm no error messages are present
- Confirm that the light output knob is not rotated to the 0% position
- Confirm that the shutter, if applicable, is not in the fully closed position
- If using a filter wheel, send a “HOME” command to ensure it is not blocking the light path; and confirm that the filter position in the light path does not contain a blanking plate

Problem: On initial start up, illumination is very dim!

Suggested solution:

- The unit requires 5 minutes to warm up and 15-30 minutes to reach full brightness
- Ensure that all connections are firm and that the liquid light guide is correctly installed.
- Confirm that the bulb is installed correctly (you must wait 30 minutes after shutting down the unit before opening the access panel).

Problem: Just changed bulbs and illumination is not bright

Suggested solution:

- Confirm that the bulb is installed correctly (you must wait 30 minutes after shutting down the unit before opening the access panel).

Problem: Just changed bulb and the alarm sounds continuously.

Suggested solutions:

- Check for error messages on display!
- Turn off unit, wait 30 minutes and confirm that the data connector is installed completely into the PCB located at the base of the bulb.

Problem: Alarm sounds every time the unit is turned on

Suggested solutions:

- Check display on front of unit for error messages
- Confirm, if possible, that bulb has not exceeded the error time
- Confirm that the fan vents are not covered or blocked

Problem: The bulb has failed/broken

Suggested solution – see below!

5.3 What to do in the event of bulb failure or breakage!

If your institution has a mercury spill procedure that will take precedent over this document!

In the event that a Lumen lamp breaks the following action **MUST** be taken!

- ALL PERSONNEL SHOULD IMMEDIATELY EVACUATE THE ROOM
- TURN OFF ALL AIR RECIRCULATING EQUIPMENT SUCH AS AIR CONDITIONING
- OPEN WINDOWS TO VENTILATE THE AREA FOR AT LEAST 30 MINUTES
- WEAR LATEX OR NITRILE GLOVES TO REPLACE AND DISPOSE OF THE BULB



If the breakage has occurred within the unit

- Disconnect the unit from the main power supply
- WEAR DISPOSABLE GLOVES
- Wait for the unit to cool; open the cover and remove the bulk of the lamp.
- Place the lamp in its box
- Carefully remove any shards of glass from the lamp house area and place them in the lamp box
- If mercury is visible, it can be removed using a pipette (NOT a mouth suction type!) and placed in a sealed container such as a small capped glass bottle
- Using duct tape or similar, clean up any remaining small particles of glass
- Remove the rear cover and treat this area as per the lamp house
- Place the lamp box, and any substance or container used to clear up the mercury in a polythene bag
- Remove the foam air filters and place them in the bag.
- Wipe down the lamp house and rear of the unit with damp paper towels. Place the towels in the bag
- Place this bag inside another polythene bag and seal it
- Place this bag inside a robust cardboard box and sent it to Prior Scientific for disposal
- Fit new filters to the rear cover and refit the rear cover

If the breakage has occurred outside the unit:

- If only the reflector is damaged and the bulb is intact then the lamp can be treated as broken glass and along with any shards (using appropriate care) should be placed back in its box.
- If the bulb is broken mercury may have been released. Use the same procedure for evacuation, ventilation and clear up as detailed above.
- In either case return the case to Prior Scientific Instruments Ltd.



Outside the UK dispose of the bulbs in accordance with local authority regulations.

REPLACEMENT PARTS SECTION 6

Description	Part Number	Part number
Prior Bulb		LM375
Fuse		W3814
Liquid Light Guide		LM587
Filter Wheel Cable		HF300
Filter Changing Tool		LM589

Adapters

Olympus Adaptor (BX series)	LM10OL
Olympus Adaptor (IX series)	LM10IX
Zeiss Adaptor (Axio series)	LM10ZS
Zeiss Adaptor (Axiovert 25/40 series)	LM10Z25
Nikon Adaptor	LM10NI
Leica Adaptor (DM series)	LM10LC
Leica Adaptor (Stereo series)	LM10LS
Motic Adaptor	LM10MT

RETURNS AND REPAIRS

SECTION 7

Should you experience problems with your Lumen System and want to send it back for service, warranty or otherwise, **a Return Material Authorisation (RMA) number must be obtained from the appropriate Prior Scientific office before returning any equipment.**

For North and South America contact Prior Scientific Inc., for Japan contact Prior Scientific KK, for Germany, Austria and Switzerland contact Prior Scientific GmbH and for the all other countries contact Prior Scientific Instruments Limited on the telephone numbers shown below.

Prior Scientific Instruments Ltd.
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For more assistance, please do not hesitate to contact Prior Scientific

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