# Nm1 THE NEWTON MICROSCOPE

THE LATEST IN PORTABLE FIELD MICROSCOPY

## PRODUCT SPECIFICATION

The optical system is based on the RMS standard, and offers the traditional range of objective magnifications and eyepiece interchangability.

To achieve a compact form the microscope has an inverted monocular format and uses miniature objectives, three dimensional folded optics, simplified mechanics, and a built in LED illumination system. To extend general usability the Nm1 can be tripod mounted for bench operation, XY or slide clips attachable, and digital camera and smart phone attachable.

## SPECIFICATION

- Monocular inverted
- 3D folded optical path
- RMS standard path length and eyepiece fitment
- Miniature objectives design
- 0.17mm cover slip corrected
- Objective carrier up to x3 mounts
- Standard fitment x10 N/A 0.25, x40 N/A 0.65
- Optional third objective x60 N/A 0.80, or x100 oil N/A 1.25 - factory fit only
- Standard eyepiece fitment x10 wide field
- Built-in white LED illumination source
- Variable illumination output
- Incident and dark ground
- External USB power connectable
- Internal power 3 x AAA battery pack
- Built in battery power saver
- Battery life approximately 1,000 hours at minimum continuous power
- Battery life approx 300 hours at maximum continuous power
- x2 standard tripod mounting bushes
- 2 x slide clips as standard - Nm400 only
- Mircometer XY slide indexer - Nm1 600XY/Nm1 1000XY only
- Cavity (fluids) slide supplied as standard
- Slide clips as standard
- Digital camera attachable
- Mobile phone camera 'attachable'
- Die-cast and machined optical chassis
- Hardened bearing surfaces
- Die-cast Aluminium stage
- Injection moulded rubber coated PC/ABS case
- Weight as supplied (2 objectives + batteries) 480 grams
- Size (main body) – Length 133mm, width 110mm, height 49mm
- Size (max overall) – Length 154mm, width 122mm, height 66mm

## OPTICAL SPECIFICATION

### MIRRORS

- Precision ground 2.0 mm glass
- Front silvered and coated
- Surface accuracy, mirror No1 = 3-4 fringes
- Surface accuracy, mirror No2 and No3 = 5 fringes
- Multi-coated
- Laser aligned
- Plated brass mounts

### OBJECTIVE LENSES

- Achromat
- Precision ground Schott glass
- CNC machined hard anodised aluminium lens turret.
- Corrected for 0.17mm cover slip
- x10 N/A 0.25
- x40 N/A 0.65
- x60 N/A 0.80
- x100 oil N/a 1.25

### OPTICAL CHASSIS AND FOCUS CARRIAGE

- Precision high pressure die-cast Aluminium alloy
- CNC machined mirror mounts: Linear +/- 0.1mm, angular +/-0.25 degrees
- CNC machined bores and shafts: Diametric +/- 0.015mm.
- Fully hardened Rotational and sliding bearing surfaces
- General surfaces aluminium oxide pressure blasted and black anodised

## CONTROLS & FEATURES TOP


**1 ILLUMINATION** ▸ The illumination source is a built in white LED. The LED is located in an adjustable arm that positions the beam directly over the specimen. The arm can be incrementally raised or lowered for various dark ground illumination effects, or swivelled completely up to the vertical to allow clear access to the stage. The LED is switched on using the illumination button. A single press for on, and a single press for off. The LED will automatically switch off after approximately 15 minutes, and the light can be switched on again with a single button press. The timer is bypassed when an external power source is used and allows continuous illumination at the control of the button. The viewing brightness can be controlled by rotating the thumb wheel underneath for increased or decreased intensity in the direction indicated by the graphic. Higher magnifications require higher lighting levels. Beware that at x10 the illumination needs to be pre set to the lowest level before viewing to avoid discomfort from over-brightness. Further reduction in brightness can be achieved by lifting the lighting arm slightly. Generally the lowest lighting level is sufficient for the x10 and x40 objectives, and a fresh top grade battery pack can deliver over 1000 hours illumination. At maximum power battery life will be reduced by up to 70%

**2 FOCUS** ▸ The Focus control wheel is an endless bi-rotational control, delivering the full focus range within a single 360 rotation in either direction. Focus therefore can be achieved quickly regardless of which direction the wheel is turned.

**3 SLIDE CLIPS** ▸ These can be positioned independently to suit differing requirements and also swivelled completely around to clear the stage area.

## CONTROLS & FEATURES **BASE**

**4 MAGNIFICATION** ▸ The Nm1 can carry up to 3 objectives and is available in the following configurations:

**Nm1 400** = x10 and x40 objectives fitted

**Nm1 600XY** = x10, x40, and x60 objectives fitted

**Nm1 1000XY** = x10, x40, and x1000 objectives fitted

Objective positions are numbered 1 to 3. Position 1 is x10, position 2 is x40 and position 3 is the expansion option which may be a blanking plug, a x60 or x100 objective depending on the Newton model. The magnification power is marked on the top of each objective using standard colour-coding conventions. Objectives are selected by rotating the magnification knob located in the centre of the underside of the microscope. This may be rotated in either direction and the selected objective should lightly click into


**5 ILLUMINATION BRIGHTNESS** ▸ The viewing brightness can be controlled by rotating the thumb wheel underneath for increased or decreased intensity in the direction indicated by the graphic.

**6 EXTERNAL POWER** ▸ It is possible to use external power sources to drive the lighting system instead of relying on the internal battery pack. External power sources can also create a slightly brighter light if required. The supplied USB cable connects into the socket in the side, and can be driven from a PC or a USB mains plug adaptor (often found on mobile phone chargers and also on iPod/iPhones). When using external power sources the automatic cut out is overridden.

**7 MOUNTING** ▸ Although the Newton is a portable microscope it may be attached to a tripod. This is particularly useful for longer periods of investigation and reduces fatigue. There are two standard tripod mounting points underneath and the mount nearest the brightness control tends to give clearer access to the magnification changer when mounted. Cambridge Optronics recommend the Cullman Nanomax 200T.

## ADDITIONAL FEATURES

**CAVITY SLIDE** ▸ For examining fluids and small particles. Standard size slide in clear Acrylic with 1.0mm deep x 10mm diameter cavity, with 0.17mm thin glass base. Operates across full magnification range.

**DIGITAL PHOTOGRAPHY** ▸ The Newton can be attached to a range of digital cameras using the Newton camera link, and also smart phones using the Newton iphone or Android Adaptor.

**XY SLIDE INDEXER** ▸ The Newton XY slide indexer is a standard fitment for the Nm1 600XY and Nm1 1000XY, but can be retrospectively purchased and fitted to the Nm1 400.

**TRIPOD** ▸ Cullman nanomax 200T is the most suited tripod tested to date for the Newton. Tripod mounting can free up the hands when using the Newton Camera link, and long periods of investigative work with the XY.

## PRODUCT CARE

The Nm1 is a miniaturised scientific instrument with high precision mechanical and optical parts with comparable optical performance to that of a good quality bench microscope.

The optical system and mechanical movements use robust die-cast and precision CNC machined and anodised Aluminium parts, protected by a rubber coated injection moulded outer casing.

The Newton is rugged, dust-proof and splash-proof. Nevertheless it is a precision instrument and should be treated with the same care accorded to a camera