Vision
ENGINEERING

MERLIN

User Guide

Merlin 300 2-axis Video Measuring System

Merlin 2-axis Video Measuring System

Vision Engineering manufacture a wide range of patented optical systems, offering fatigue-free viewing with superb hand-eye co-ordination, for improved quality and productivity.

Merlin is an easy to use compact system, that can be combined with a range of accessories including alternative magnification, footswitch, image capture and data processing options. For further details, contact your Vision Engineering representative or distributor.

To achieve the most from this precision instrument, please read the enclosed assembly instructions, usage and maintenance guidelines.

Health & Safety

Vision Engineering and its products conforms to the requirements of the EC Directives on Waste Electrical and Electronic Equipment (WEEE) and Restriction of Hazardous Substances (RoHS).

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Head

1 Camera

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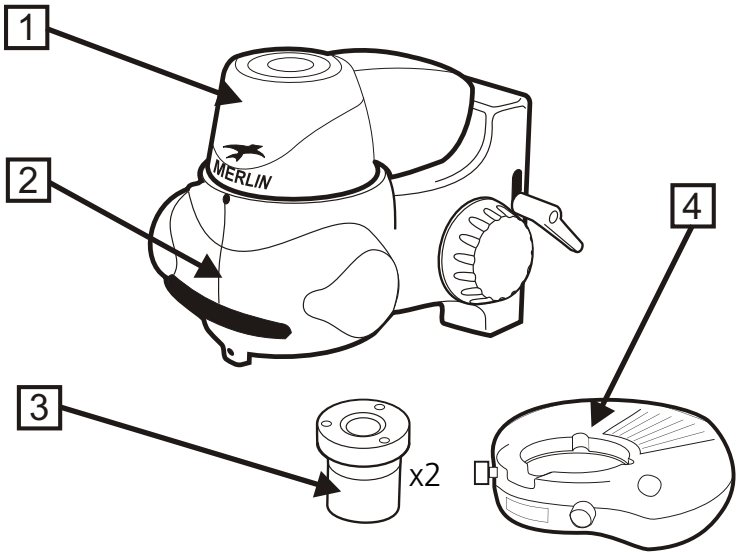
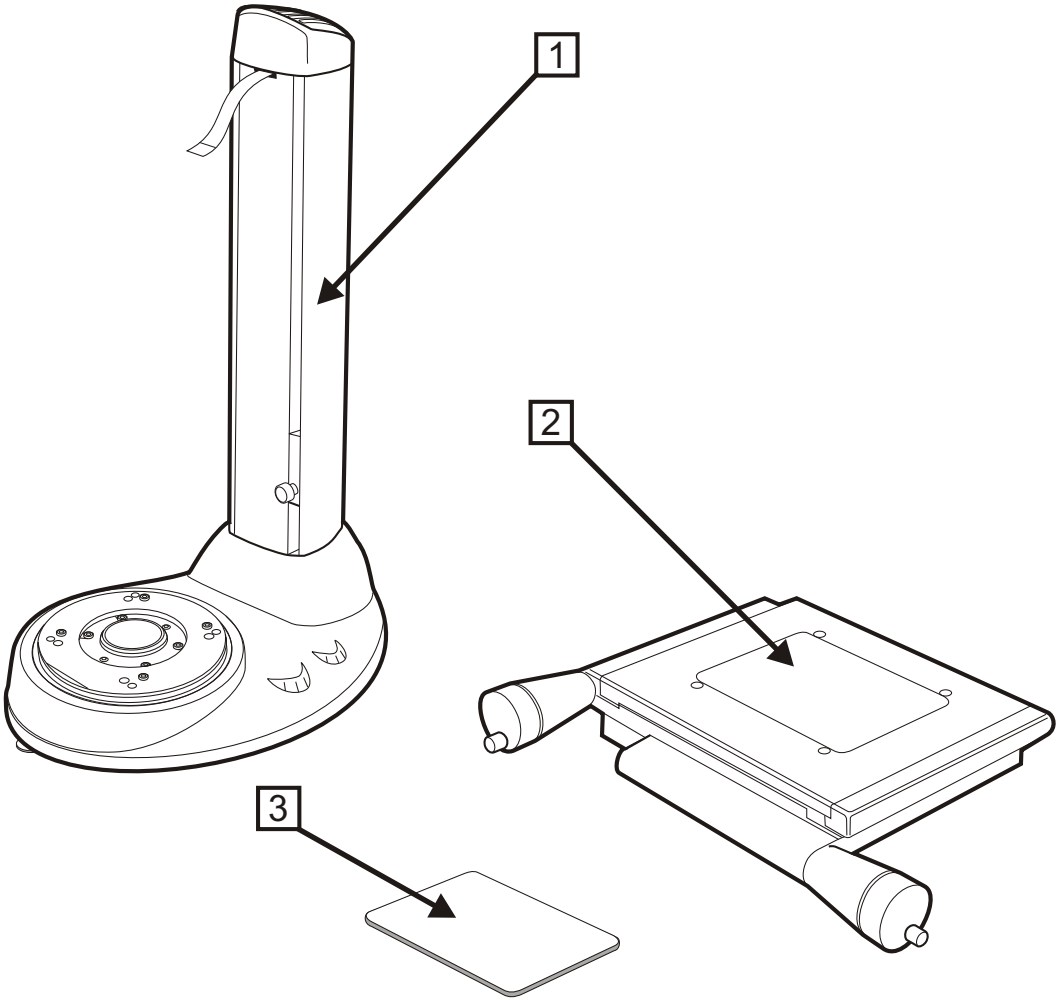


Stage & Stand

1 Column & Stand

2 Stage

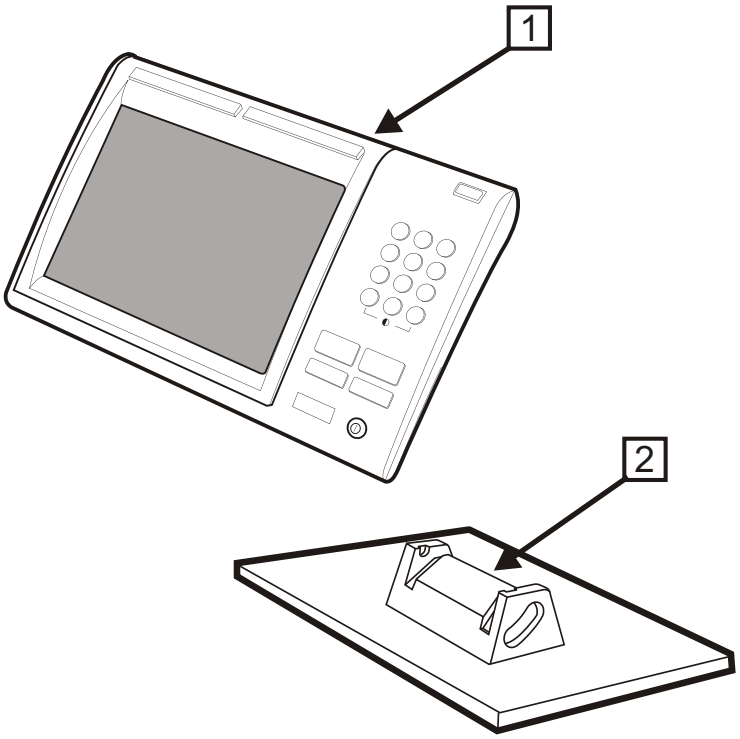
3 Stage Glass



Microprocessor

1 Quadra-check 300 microprocessor

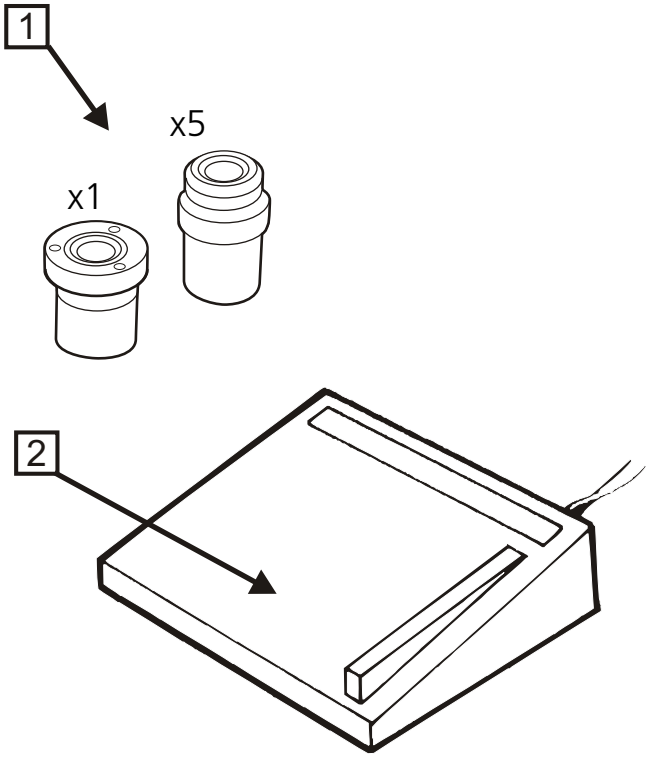
2 Microprocessor stand



Accessories

1 Objective lenses

2 Footswitch (optional)

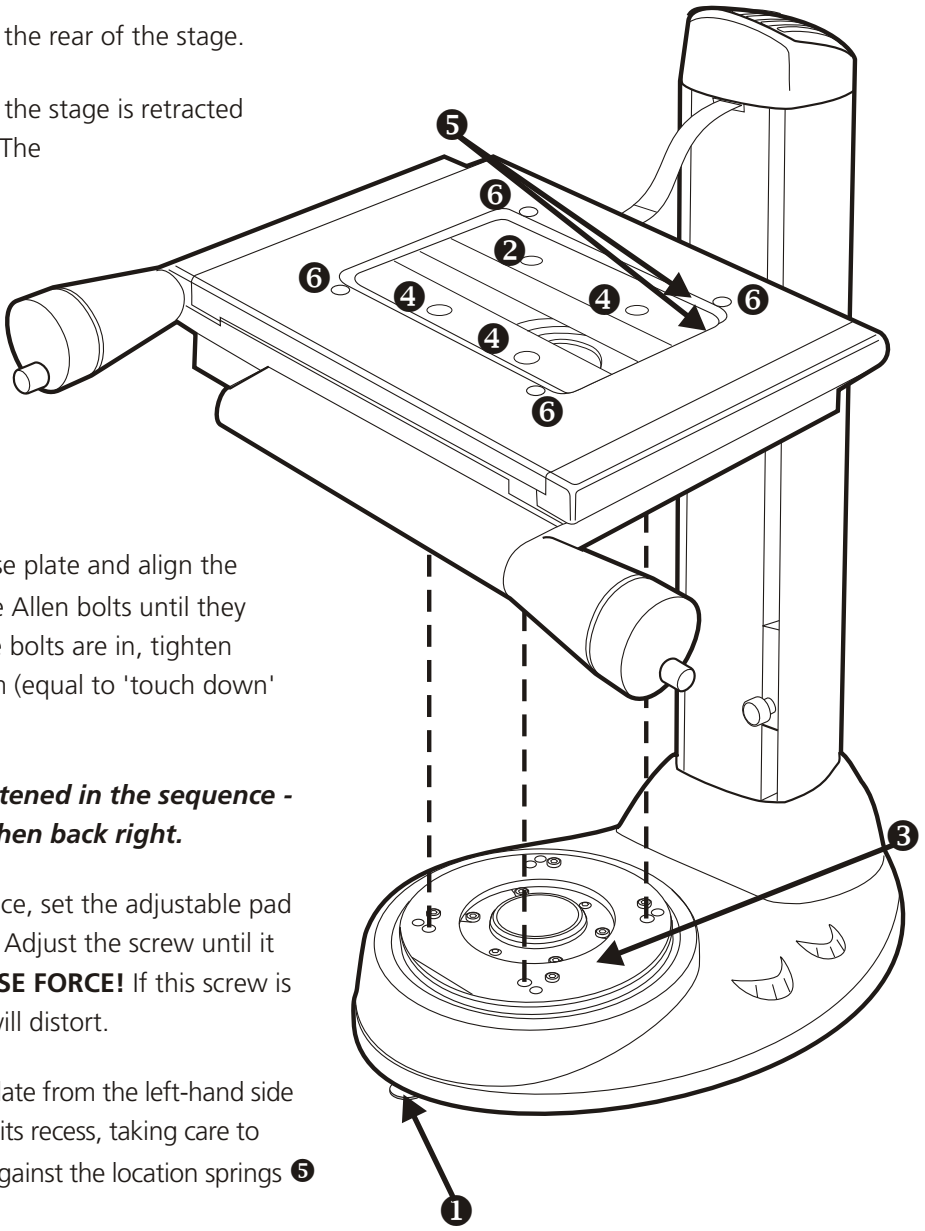


Stage assembly

- Use the stabilizing foot ❶ to ensure the base is stable.
- Remove the red locking plate at the rear of the stage.
- Check the adjustable pad ❷ on the stage is retracted up into the stage bottom plate. The adjustable pad is controlled by the screw in the rear left hole in the aperture under the stage glass.
- Check the stand base plate ❸ and the underside of the stage are clean and free of any debris.
- Place the stage on the stand base plate and align the three bolt holes ❹. Screw in the Allen bolts until they just touch down. When all three bolts are in, tighten them to a torque setting of 2Nm (equal to 'touch down' plus ⅛ turn).

NOTE: ***The bolts must be tightened in the sequence - front right, front left then back right.***

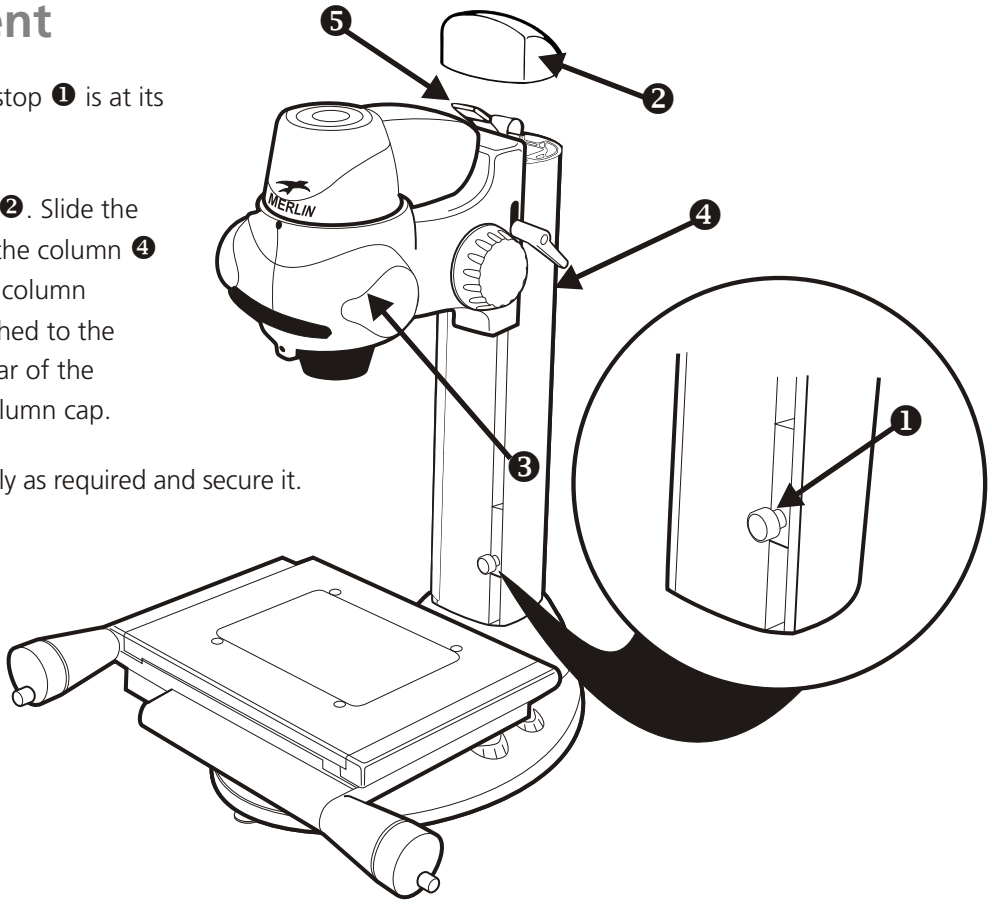
- Once the 3 Allen bolts are in place, set the adjustable pad using a flat headed screwdriver. Adjust the screw until it just touches down - **DO NOT USE FORCE!** If this screw is over tightened, the base plate will distort.
- Remove the second red locking plate from the left-hand side of the stage and fit the glass into its recess, taking care to locate its rear right-hand corner against the location springs ❺ and on to the supports ❻.



NOTE: ***Ensure the stage glass is in contact with all 4 supports.***

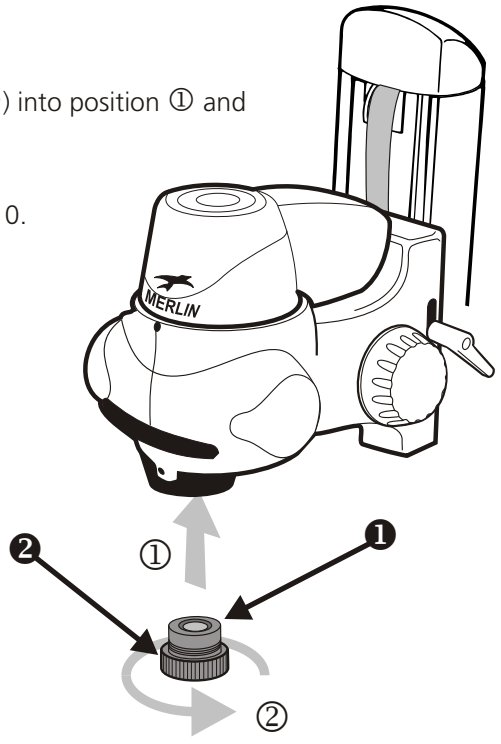
Head attachment

- Ensure the coarse travel stop ❶ is at its lowest position.
- Remove the column cap ❷. Slide the head assembly ❸ on to the column ❹ just enough to allow the column connector ❺ to be attached to the male connector at the rear of the assembly. Replace the column cap.
- Position the head assembly as required and secure it.



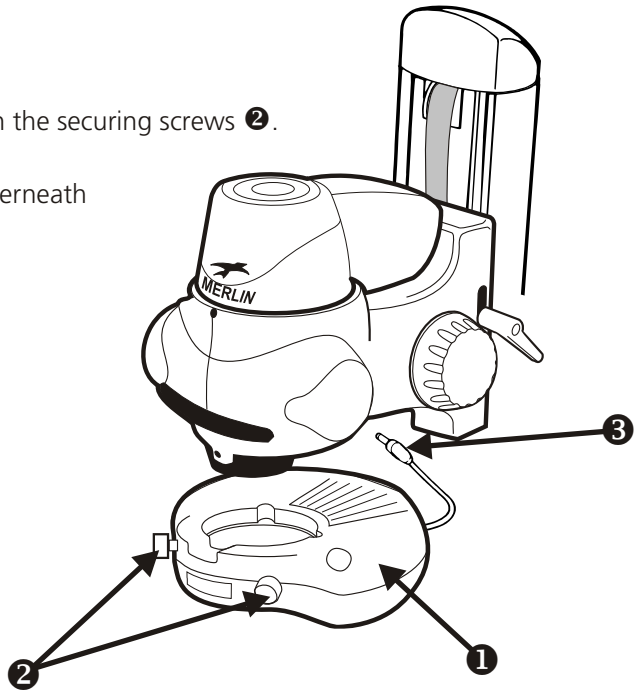
Objective lens attachment

- Place the objective lens ❶ (with integral iris control ❷) into position ① and secure it with a half turn to the right ②.
- For further information, see **Objective lens** on page 10.



LED surface illuminator

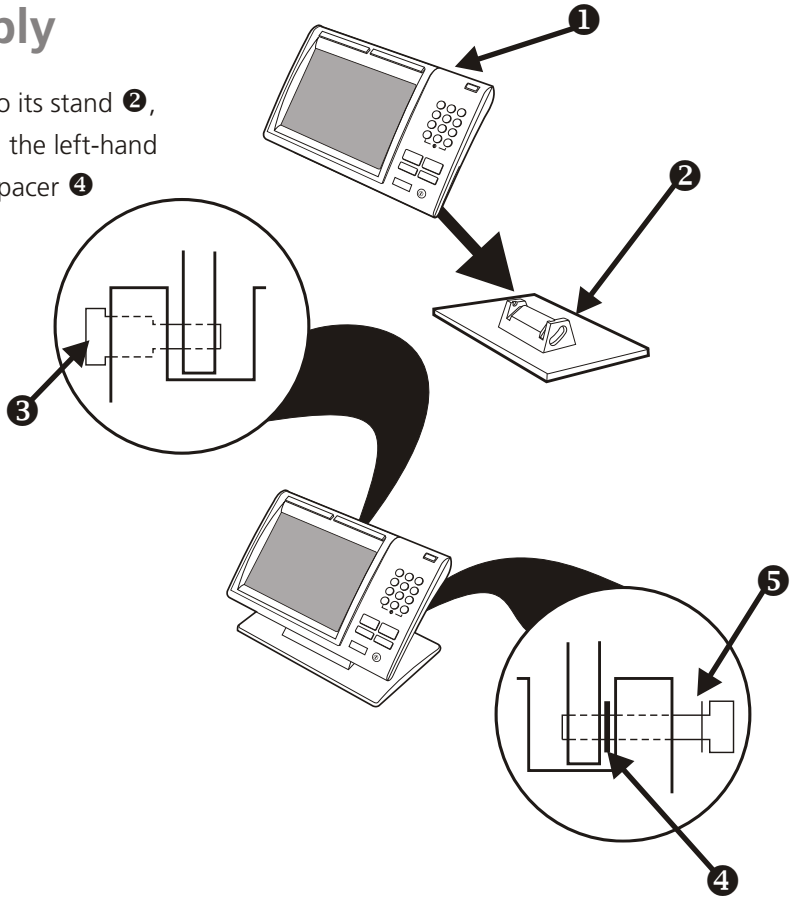
- Place the surface illuminator ❶ into position and tighten the securing screws ❷.
- Insert the illuminator's connector ❸ into the socket underneath the head assembly.



Microprocessor assembly

- Locate the microprocessor body ❶ on to its stand ❷, ensuring the shoulder bolt ❸ is used on the left-hand fixing (looking from the front) and the spacer ❹ and locking washer ❺ are correctly positioned on the right-hand fixing.

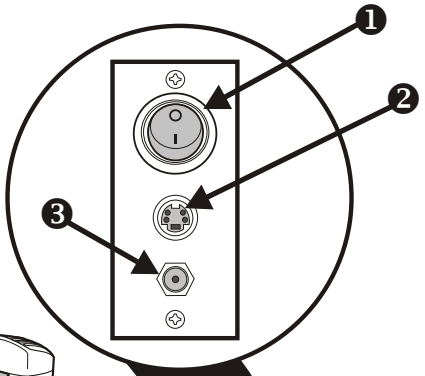
Note: ***Do NOT overtighten either fixing bolt.***



Cable connection

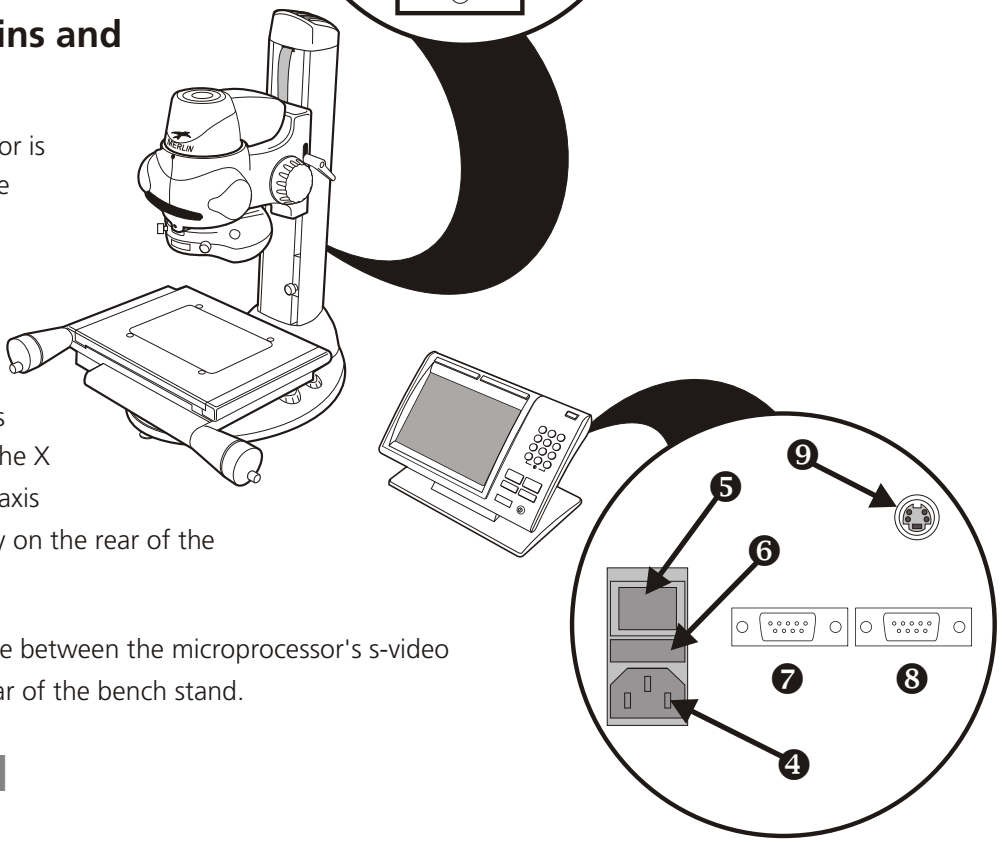
Bench stand mains connection

The mains input connector is located on the rear of the bench stand and is comprised of the on/off switch ❶, s-video socket ❷ and power input socket ❸.



Microprocessor mains and data connection

- The mains input connector is located on the rear of the microprocessor and is comprised of the input socket ❹, on/off switch ❺ and fuse ❻.
- Connect the X and Y axis leads from the stage to the X axis connector ❼ and Y axis connector ❽ respectively on the rear of the Microprocessor.
- Connect the s-video cable between the microprocessor's s-video connector ❾ and the rear of the bench stand.

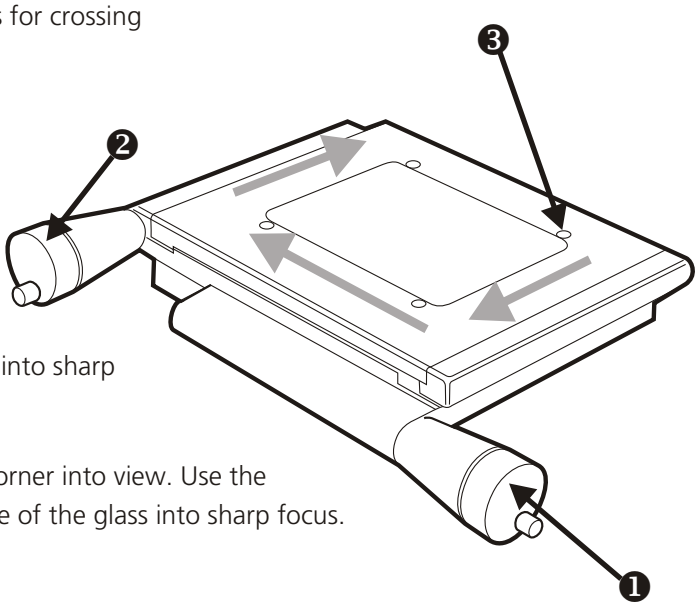


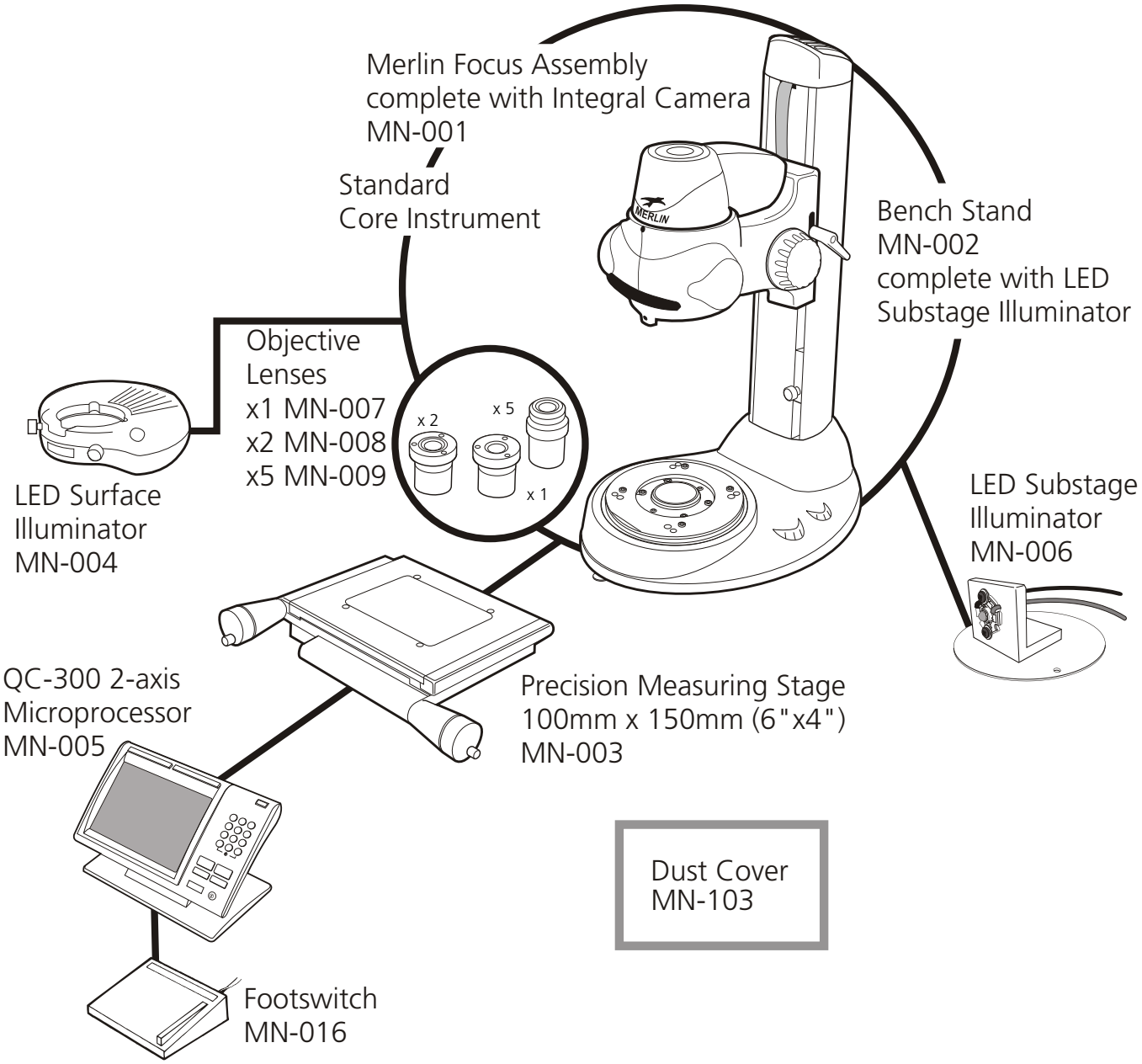
Getting started

- Switch on Merlin.
- Switch on QC-300 and follow on screen instructions for crossing reference marks. The System is now ready for use.

Stage Glass Levelling

- Use the X axis ❶ and Y axis ❷ controls to bring the rear right-hand corner of the stage glass (fixed corner) ❸ into view.
- Use the fine focus control to bring the glass surface into sharp focus.
- Use the axis controls to bring the front right-hand corner into view. Use the relevant adjustable glass support to bring the surface of the glass into sharp focus.
- Repeat for the remaining 2 corners.
- Repeat the above steps if necessary until all 4 corners are in focus.




Merlin Focus Assembly
complete with Integral Camera
MN-001
Standard
Core Instrument
Bench Stand
MN-002
complete with LED
Substage Illuminator
Objective
Lenses
x1 MN-007
x2 MN-008
x5 MN-009
x 2
x 5
x 1
LED Surface
Illuminator
MN-004
LED Substage
Illuminator
MN-006
QC-300 2-axis
Microprocessor
MN-005
Precision Measuring Stage
100mm x 150mm (6"x4")
MN-003
Dust Cover
MN-103
Footswitch
MN-016

A wide range of optional accessories can be used with the Merlin measuring system, further expanding on system capability. For more information, please contact your Vision Engineering branch, local authorised distributor or visit our website.

Lens options

In addition to the standard x2 objective lens, x1 and x5 options are available.

Merlin footswitch

For entry of multiple data points, the footswitch connects directly into the QC-300 microprocessor.

Merlin software

The standard Merlin configuration not only allows for accurate gauging and PASS/FAIL results to be generated, but expands on these capabilities considerably, providing a higher level of reporting and result analysis. Used in conjunction with the Merlin 2-axis system and QC-300 microprocessor, the sophisticated software allows operators to specify the video image contrast response they require. Additionally, the component part being measured can be adjusted on the stage and the multiple edge probe will still enable accurate measurement, even when the component's feature is only partially in the centre of the probe. See Figure 1.0 below.

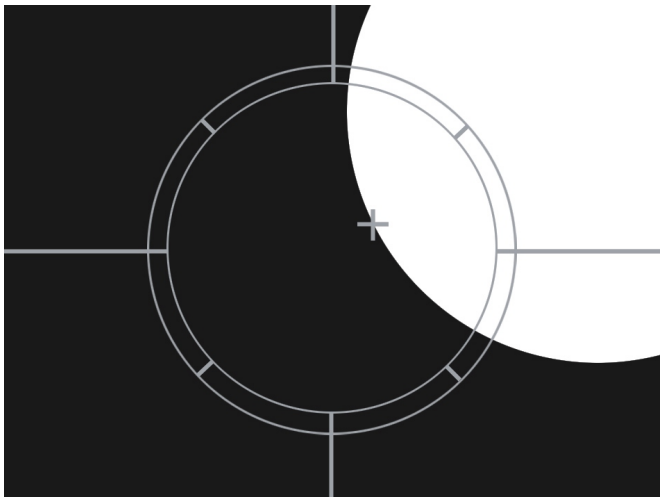


Figure 1.0

Item	Specification	Part Number
Lens options	x1 & x5 Objectives	MN-007, MN-009
Merlin Footswitch	Footswitch for data entry	MN-016

Main system controls

1 Locking Lever (Height Adjustment Control)

2 Focus Control

3 Travel Stop

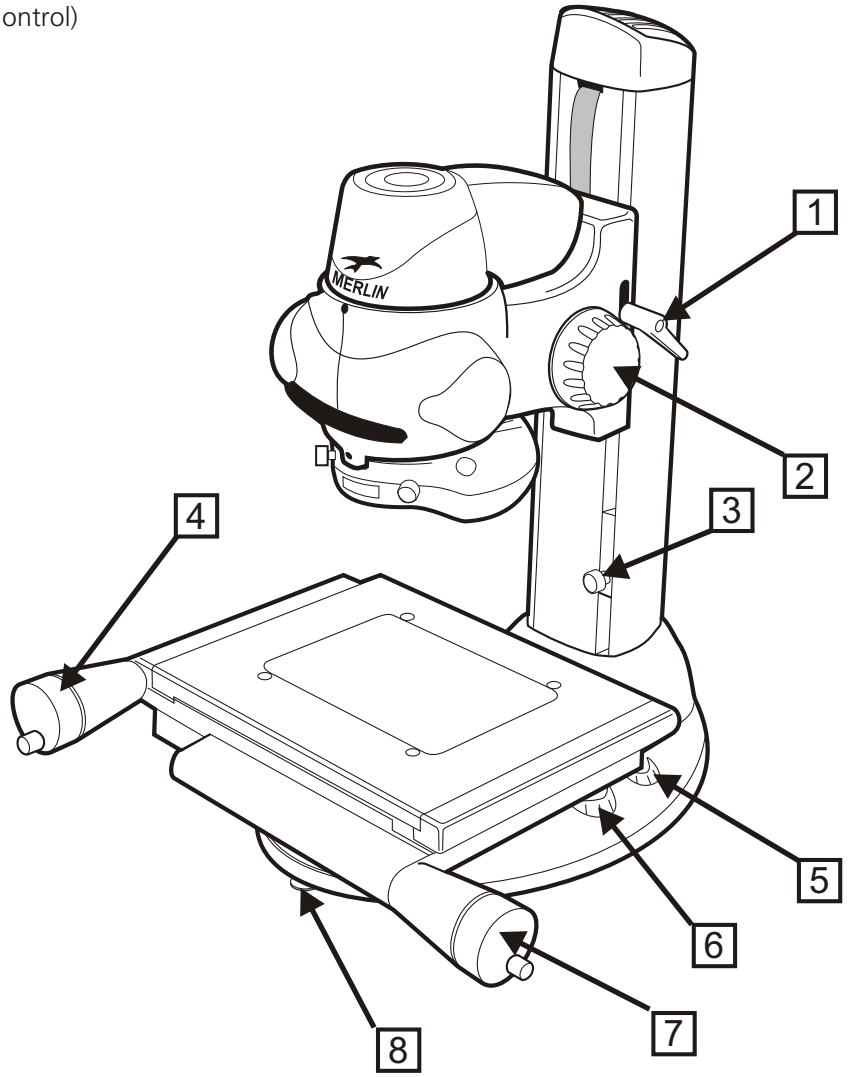
4 Y Axis Control

5 Surface Illumination Thumbwheel

6 Substage Illumination Thumbwheel

7 X Axis Control

8 Stabilising Foot



- ▶ Switch the Merlin on.
- ▶ Adjust the height adjustment control until you can focus on the stage glass then adjust the focus control for optimum focus.
- ▶ Move the travel stop up to the base of the focus assembly and lock it in place.

To achieve the optimum results from your Merlin measuring system, the illumination and optics need to be optimised to provide the best possible image. Certain lighting configurations are better for some applications than others. Substage illumination should be used for profile measurement whilst surface illumination should be used for subjects with more surface features.

Illumination and focus should be adjusted until the image is clear and bright, with good contrast. Maximum contrast improves accuracy and repeatability.

Contact your nearest Vision Engineering branch or distributor if you require further advice.

Objective lens

Iris control

Each objective lens has an adjustable iris which restricts the aperture of the lens. By rotating the control ring on the bottom of the objective lens, the iris opens and closes. Adjusting the objective lens aperture changes the amount of light passing back through the lens. This has the effect of slightly increasing or decreasing the depth of field. This feature is useful for subjects where greater surface definition is required.

Magnification table

Part No.	Objective Magnification	Total System Magnification	Working Distance	Field of View
MN-007	x1	10x	81mm	14.2mm
MN-008	x2	20x	81mm	7.1mm
MN-009	x5	50x	61mm	2.9mm

Illumination options

Substage

- Understage illumination used for the accurate measurement of through holes, profiles and edge features for example.
- Adjust intensity by rotating thumbwheel on Merlin base (see page 9).
- Can be used with LED surface light.

Surface

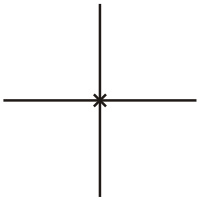
- Above stage illumination used for surface features and blind holes for example.
- Adjust intensity by rotating thumbwheel on Merlin base (see page 9).
- Can be used with substage illumination.

Taking a Measurement

Select the correct lens for the component being measured based on size of component and field of view (see magnification table on page 10). Focus the head on the feature to be measured by adjusting the head and focus assembly on the stand, firstly with the height adjustment control. Do this by undoing the locking lever on the side of the focus assembly and moving the whole assembly up or down the stand dovetail. Fine focus is achieved by rotating the focus control wheel on either side of the focus assembly (see page 9)..

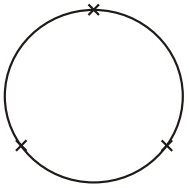
A measurement is made by placing the subject on the stage, then moving the stage until the required edge of the feature is within the video tool or the crosshair is aligned (see QC-300 User Guide for further details).

- A point is measured by probing 1 point



- A line is measured by probing a minimum of 2 points

- A circle is measured by probing a minimum of 3 points



Further details on taking measurements can be found in the QC-300 microprocessor user guide.

Good Working Practices

When taking points on features the point should always be approached in the same fashion e.g. always work towards a point in the X axis first, moving from left to right. Next move towards a point in the Y axis, moving from top to bottom. This procedure will increase repeatability.

If looking to measure the form of a feature, it is best to take at least eight points to achieve the most repeatable result.

To achieve the very best from your Merlin non-contact measuring system, you should carry out regular, routine maintenance as well as undertaking a schedule of servicing and calibration (see service & calibration record page)

Routine Maintenance (see page 13)

- The outside of the instrument should be wiped down to remove any dirt and dust
- The instrument and accessories should be checked for loose or damaged components
- When not in use, protect Merlin with Dust Cover

Consumable & Replacement Parts:

Item	Specification	Part Number
Surface light LED array	20 LEDs, 1,100 lux (filtered)	MN-010
Stage glass	150mm x 100mm	K-018
Substage LED	330 lux (filtered)	MN-006

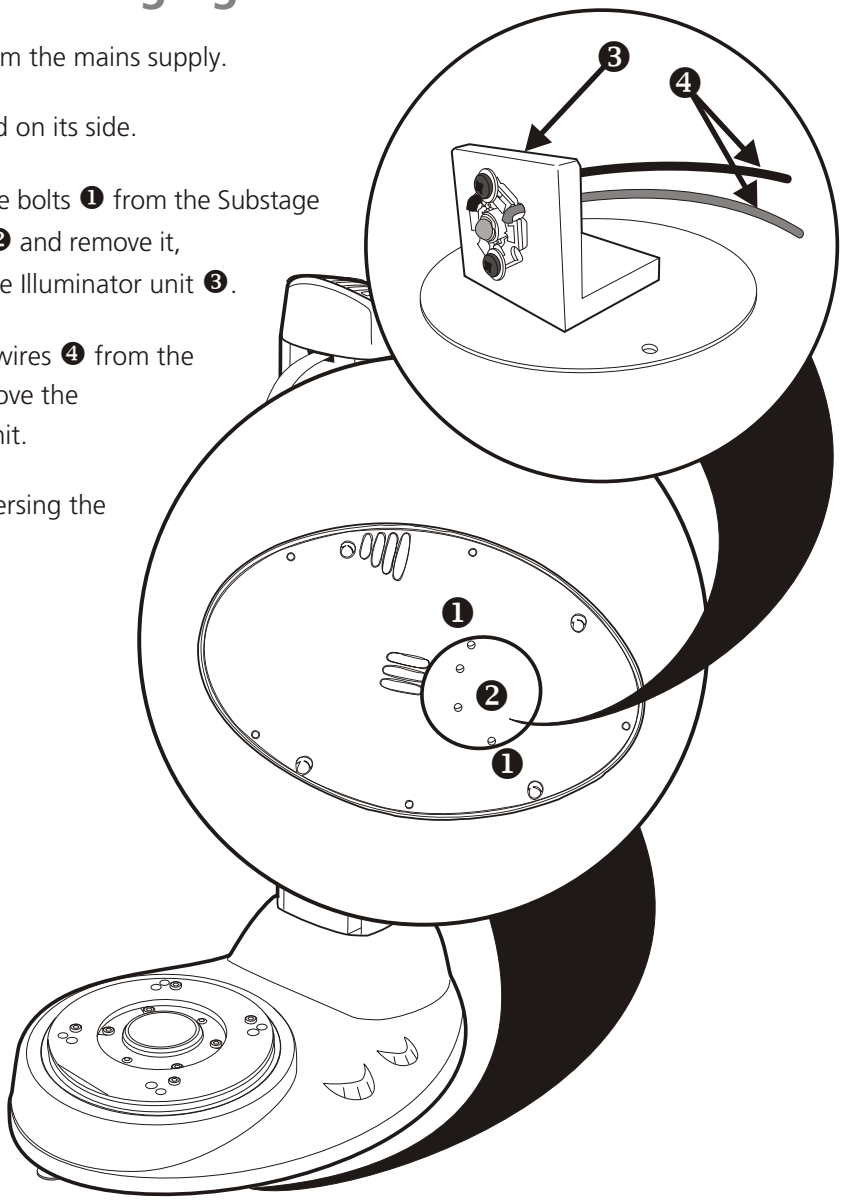
Environmental Considerations

Merlin is an accurate, industrial gauging instrument. To achieve the optimum accuracy and repeatability, the following considerations should be taken into account:

- Position the Merlin on a firm, rigid and level table
- Avoid locating the instrument near to any source of vibration
- Do not position the instrument close to a radiator or similar heating system
- Do not position the instrument in direct sunlight, or where bright reflections will prevent a comfortable viewing position.

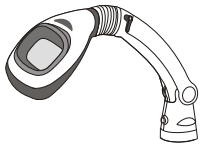
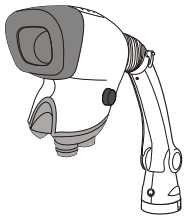
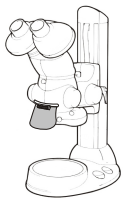
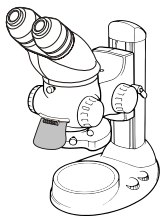
Substage lamp changing

- Disconnect the unit from the mains supply.
- Carefully turn the stand on its side.
- Remove the two outside bolts ❶ from the Substage Illuminator base plate ❷ and remove it, complete with Substage Illuminator unit ❸.
- Disconnect two flying wires ❹ from the internal wires and remove the substage illuminator unit.
- Fit the new unit by reversing the above procedure.



Vision Engineering manufactures a wide range of stereo inspection and non-contact measuring systems. For all product information, please visit our website.

Stereo inspection systems

Product	Picture	Features	Description
Lentis		• 2.5 dioptres • Multi layered anti reflective coated lens	A state of the art bench magnifier for inspection, manipulation and material rework.
Mantis		• x4 - x20 Magnification • Shadow-free LED cold illumination, both surface and substage • Long working distances, large depth of field	The Mantis family is a unique range or optical systems without eyepieces, for intricate tasks requiring superb quality viewing over long periods of use. Available with universal arm or rigid bench stand option.
Alpha		• x2.1 – x160 magnification • Camera option • Expanded Pupil eyepieces	Expanded Pupil eyepiece stereo zoom microscope. Available in boom and bench stand configuration with a wide range of optional accessories (e.g. lighting, cameras)
Beta		• x2.1 – x160 magnification • Camera option • Conventional eyepieces	Conventional eyepiece stereo zoom microscope. Available in boom and bench stand configuration with a wide range of optional accessories (e.g. lighting, cameras)
Lynx		• X2.1 – X120 magnification • 77mm – 1.75mm field of view • Camera option • Eyepieceless viewing system	Advanced eyepieceless stereo zoom microscope. Available in boom and rigid stand configuration with a wide range of optional accessories (e.g. lighting, cameras)

Non-contact measuring systems

Product	Picture	Features	Description
Kestrel		• 150mm x 100mm stage • QC-200 Microprocessor • Eyepieceless viewing system • Video Edge Detection option	Entry level, 2-axis measuring system. Ideal for shop floor gauging applications.
Hawk manual		• 150mm x 150mm stage • 2 or 3 axis capability • Large stage option • Eyepieceless viewing system • Video Edge Detection option	Advanced manual measuring system, offering increased accuracy and capacity. Operates with QC-200 and QC-300 microprocessors.
Hawk precision		• 200mm x 150mm stage • 2 or 3 axis capability • Eyepieceless viewing system • Video Edge Detection option	High accuracy measuring system for 2 and 3 axis measurement. Operates with QC-200 and QC-300 microprocessors or QC-5000 PC software.
Hawk automatic		• 200mm x 150mm stage • Video Edge Detection • Motorised stage movement • 2 or 3 axis capability	Automated measuring system combining optical viewing head with PC based Video Edge Detection. 2 and 3 axis motorised stage movement controlled by QC-5000 PC software.

SERVICE & CALIBRATION RECORD

Merlin Serial Number _____

Stage Serial Number _____

Service Type	Comments	Date of Service	Date of Next Service	Company	Signature

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WARRANTY

This product is warranted to be free from defects in material and workmanship for a period of one year from the date of invoice to the original purchaser.

If during the warranty period the product is found to be defective, it will be repaired or replaced at facilities of Vision Engineering or elsewhere, all at the option of Vision Engineering. However, Vision Engineering reserves the right to refund the purchase price if it is unable to provide replacement, and repair is not commercially practicable or cannot be timely made. Parts not of Vision Engineering manufacture carry only the warranty of their manufacturer. Expendable components such as fuses carry no warranty.

This warranty does not cover damage in transit, damage caused by misuse, neglect, or carelessness, or damage resulting from either improper servicing or modification by other than Vision Engineering approved service personnel. Further, this warranty does not cover any routine maintenance work on the product described in the user guide or any minor maintenance work which is reasonably expected to be performed by the purchaser.

No responsibility is assumed for unsatisfactory operating performance due to environmental conditions such as humidity, dust, corrosive chemicals, deposition of oil or other foreign matter, spillage, or other conditions beyond the control of Vision Engineering.

Except as stated herein, Vision Engineering makes no other warranties, express or implied by law, whether for resale, fitness for a particular purpose or otherwise. Further, Vision Engineering shall not under any circumstances be liable for incidental, consequential or other damages.

For more information...

Vision Engineering has a network of offices and technical distributors around the world. For more information, please contact your Vision Engineering branch, local authorised distributor, or visit our website.

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