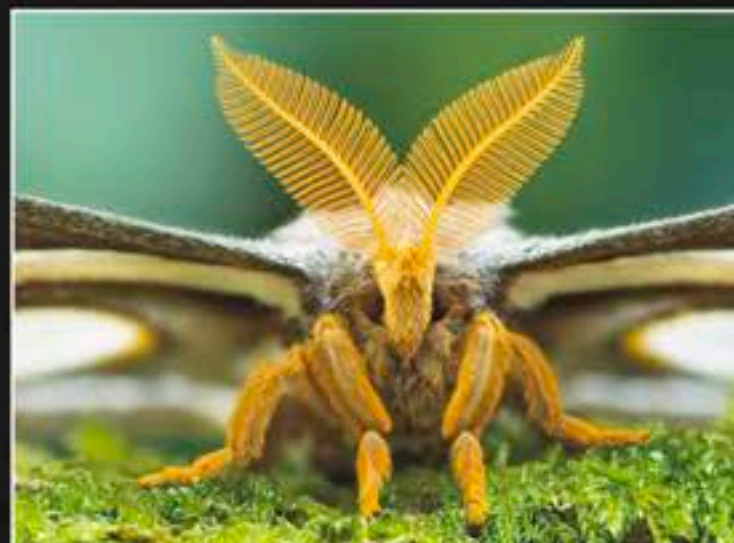


Extended Depth of Field using the Novoflex Castel-Micro Motorised Focusing Rail

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Extended Depth of Field using the Novoflex Castel-Micro Motorised Focusing Rail



The Castel-Micro complete with the ethernet cable and the control unit.

INTRODUCTION

Novoflex is a long-established company with a renowned reputation for innovation and manufacture of high-quality photographic equipment. The company was founded in 1948 by a photographer called Karl Müller and started out by manufacturing camera housings for Leica cameras. It is a highly respected company, not only in Germany but throughout the photographic industry and in many ways occupies a similar niche in the European market as Really Right Stuff does in the USA. Over the years, the company has been the innovator of many photographic products, but its reputation for constructing a wide range of equipment and accessories for macro photography is well known.

I should point out from the start that I have not been commissioned by Novoflex to write this review. The outcome here is based on my own findings of using the rail in different situations mostly in the field. Most of the current motorised rails are used primarily in the commercial sector, mainly for product

photography and at magnifications generally up to about 1:1 (life-size). However, many other macro enthusiasts use motorised rails for extreme macro photography of insect specimens and flowers, which is usually carried out in a home-made studio setup.

My own interest in the Castel-Micro rail was to see if it could be used successfully in a natural history context, mainly out in the field and if so, could it be integrated into my workflow on some of the work and commissions I frequently undertake. Also, would the advantage of controlled and precise incremental movements of the lens produce cleaner, sharper stacks than my own current techniques. I also wanted to see if it could be set up quickly in the field and what subjects would the rail be ideally suited to. Many of the challenges with focus stacking apply whether you are doing it freehand or using a controlled unit. Another important aspect from my point of view was to see if using measured and precise movements were discernible at lower magnifications over conventional variable focus rotation.

PREPARATION AND APPROACH

A successful composite image relies on several factors. One of the most important of these is having a solid, stable setup; this is essential whatever method you employ. There is little point investing in a motorised rail system if the underlying support for it is poor. Below are some of the main points to bear in mind when compiling a composite image.

Mount the camera and rail on a sturdy tripod to ensure stability and continuity in each image in terms of framing and precise focus. There are many excellent tripods to choose from but avoid cheap, lightweight models.

Switch your camera to manual, this will reduce the chances of any variation between each exposure.

Change the white balance from auto to manual and set a specific colour temperature. This is to ensure continuity in the white balance throughout the exposures otherwise any change in the light temperature could affect the colour balance during the image sequence.

The light source is another important factor that needs to be considered carefully. When photographing outdoors, you want the natural light to remain constant during the stacking sequence; any variation will result in slight differences in the exposure values of the images which will lead to artifacts in the final composite. Bright sunny days when cloud movements are constantly changing are to be avoided if possible. In challenging lighting conditions try where possible to select subjects in more shaded areas.

Lens selection is also important. The majority of macro lenses are now capable of 1:1 (life-size). However, as you become more experienced and familiar with your technique, you may want to explore the possibility of photographing at higher magnifications. I will discuss this separately using the Castel-Micro and the advantages that a motorised rail can bring to your macro photography.

Top right

The Castel-Micro rail complete with Nikon D850, with connecting cable, the 105mm micro nikkor lens and right angle bracket. Supported on the Novoflex ClassicBall 5 II Ball Head and the Benro Mach3 TMA48CLX tripod. The tripod and ClassicBall 5 II provide a very solid and stable platform for focus stacking.

Bottom right

*The camera and rail assembly in the field set up to photograph Stag's Horn Fungus (*Calocera viscosa*), which you can clearly see in Live-View on the LCD screen.*



SUBJECT SELECTION

Whether you focus stack using conventional methods such as variable focus rotation, or focus rail advancement. There are, of course difficulties and challenges to overcome, but also be prepared for failure with some subjects that do not lend themselves to the technique. There can be many reasons for this. Trying to photograph all of the images in a stack sequence under the same conditions, e.g. maintaining the correct aperture, shutter speed and white balance etc. throughout the procedure can be challenging. You may also be shooting in changing lighting conditions which may affect the final stack sequence. If the subject is static, e.g. a lichen or fungus etc., then you have time to choose your moment, or where possible use a diffuser to keep the light falling on the subject even and consistent.

Compiling focus stacks of active subjects such as insects is much more challenging. As a conservationist I don't condone the practice of killing them to facilitate a photographers self-importance. I have had an interest in insects for 30 years which has helped me gain a better understanding of their behaviour. It is possible to get some very good results with insects if you choose your time carefully and study their habits. Insects are cold-blood and therefore react to the ambient temperature. Photographing in early morning when they are torpid is an excellent time as many species will remain inactive for quite a while in lower temperatures. However, it still can be, hit or miss irrespective of any technique you employ.



Above

Bleeding Bonnet *Mycena sanguinolenta*

Camera details: Nikon D850, Nikon 105mm micro nikkor, + 2X converter, f/8

Subject size: approximately: 15mm. Magnification: 1X.

Image stack number: 35 images

Mode: Step Mode

Left

White-ringed Atlas Moth *Epiphora mythimnia*

Camera details: Nikon D850, Nikon 105mm micro nikkor, f/8.

Subject size: approximately: 15mm. Magnification: 1X

Image stack number: 40 images

Mode: Step Mode



Herb-Robert *Geranium robertianum*
 Photographed at 3.5X. The individual carpels on top of the stamens measure approximately 3mm altogether. Nikon D850, Laowa 5X macro at f/5.6, 115 shots using step mode.

ACHIEVING MAGNIFICATIONS GREATER THAN 1:1 (Life-size)

Working at magnifications beyond life-size raises many more challenges; vibration, or slightest movement of the camera can compromise the final outcome. Also, reduced depth of field at higher magnifications makes it more difficult to achieve consistently acceptable results especially when working outdoors. The variable focus technique is also less effective at greater magnifications. Most automated macro lenses do not extend beyond 1:1, and it is therefore necessary to adopt other techniques to gain higher magnifications. Lens reversal, is one approach and Novoflex do make an automated Reverse Adapter for many of the leading camera brands. The adapter retains all of the automatic functions of the lens allowing you to gain additional magnification if you do not own a macro lens. Zoom lenses work well in these situations to a point. Other approaches included placing another lens in front of the primary lens. Raynox make a range



The Novoflex automated Reverse Adapter allows you to mount the lens on your camera in reverse preserving all automatic and control functions of the lens. The wider the focal length the greater the magnification that is possible. Reversing the lens allows you to achieve greater magnifications than a conventional macro lens. The Reverse Adapter is made for a range of leading camera brands including, Canon, Nikon Z, Sony E-Mount and MicroFourThirds.

of macro conversion lenses which produce reasonable results. However all of these techniques have issues and compromises.

Over the last few years some independent lens manufactures have produced specialised macro lenses. Canon is the only major camera brand to have a macro lens capable of going beyond 1:1. The Canon MP-E65mm 1-5x macro is a manual focus lens. Venus Optics, a Chinese lens manufacturer has developed several innovative macro lenses under the brand name of Laowa. Their 100mm f/2.8 2:1 Ultra and the 25mmf/2.8 2.5-5x Ultra Macros both are manual focus and produce outstanding results especially when used on a motorised rail. Both lenses are very reasonably priced compared to the Canon and offer the macro photographer the chance to explore subjects at greater magnifications; something that the majority of major camera manufactures have sadly neglected in their lens line up!

EXTENDED DEPTH OF FIELD

Before proceeding to the main review, I think it's important to have a basic knowledge of focus stacking and some of the problems associated when applying this technique. Outlined below is a brief overview of the two approaches.

Focus stacking, or extended depth of field is not a new concept. It's been around, albeit in a more rudimentary form before the digital revolution and was primarily used in the world of photomicroscopy and by museums. The word "focus stacking" is essentially a photographic term used to describe the process of combining multiple images shot at different focusing points and merging them into a single composite image to increase the depth of field in an image.

The advancement of software technology by companies such as Helicon Focus and Zerene Stacker have made the whole process of focus stacking less complicated. Since then, Adobe Photoshop has also become a popular alternative. Excellent results are achievable with only having a basic understanding of how the process works.

APPLYING THE TECHNIQUE

Combining images to achieve increased depth of field is an amalgamation of two procedures. The first is capturing a series of photos, each taken at different focusing points to attain complete sharpness throughout the subject, or to a point of your choosing. The second is combining the images in an appropriate piece of software to produce a single composite photograph. Although it may seem a relatively straightforward process, there are pitfalls and issues to be aware of throughout the whole procedure.

There are basically two methods to focus stacking. The first, and probably the most widely practiced of the two, is, "Variable Focus Rotation", changing the point of focus by rotating the focusing ring on the lens in small, incremental steps. This method can work reasonably well at lower magnifications and with experience it is possible get acceptable results up to 1:1 with some subjects. However, the problem with this technique is the inconsistency in the incremental movement between shots, although using a small aperture can help since the overlap in depth of field can compensate to a point at lower magnifications. The downside of this method is the risk of diffraction due to the selection of smaller apertures. In addition to this you are forced into using slower shutter speeds or raising the ISO to avoid them. Lenses generally have a sweet spot and apertures of between F/8 and F/11 are best to reduce the risk of diffraction.



Citheronia laocoon larva
Variable focus rotation can produce quite acceptable results at lower magnifications.
Nikon D850, 200mm macro, 0.5X at f/8 focus stacked using variable focus rotation, 9 images.

Altering the focus point by hand with this approach becomes more of a problem as magnification increases. Rotating the focusing ring is actually changing the magnification slightly within each frame however, the software takes this into consideration during the stacking process. At higher magnifications, rotating the focusing ring has virtually no effect, as the depth of field is so shallow. Movement imparted to the setup while rotating the focusing ring on the lens, can cause problems during the blending procedure in the software resulting, digital artifacts and areas within the stack where there has

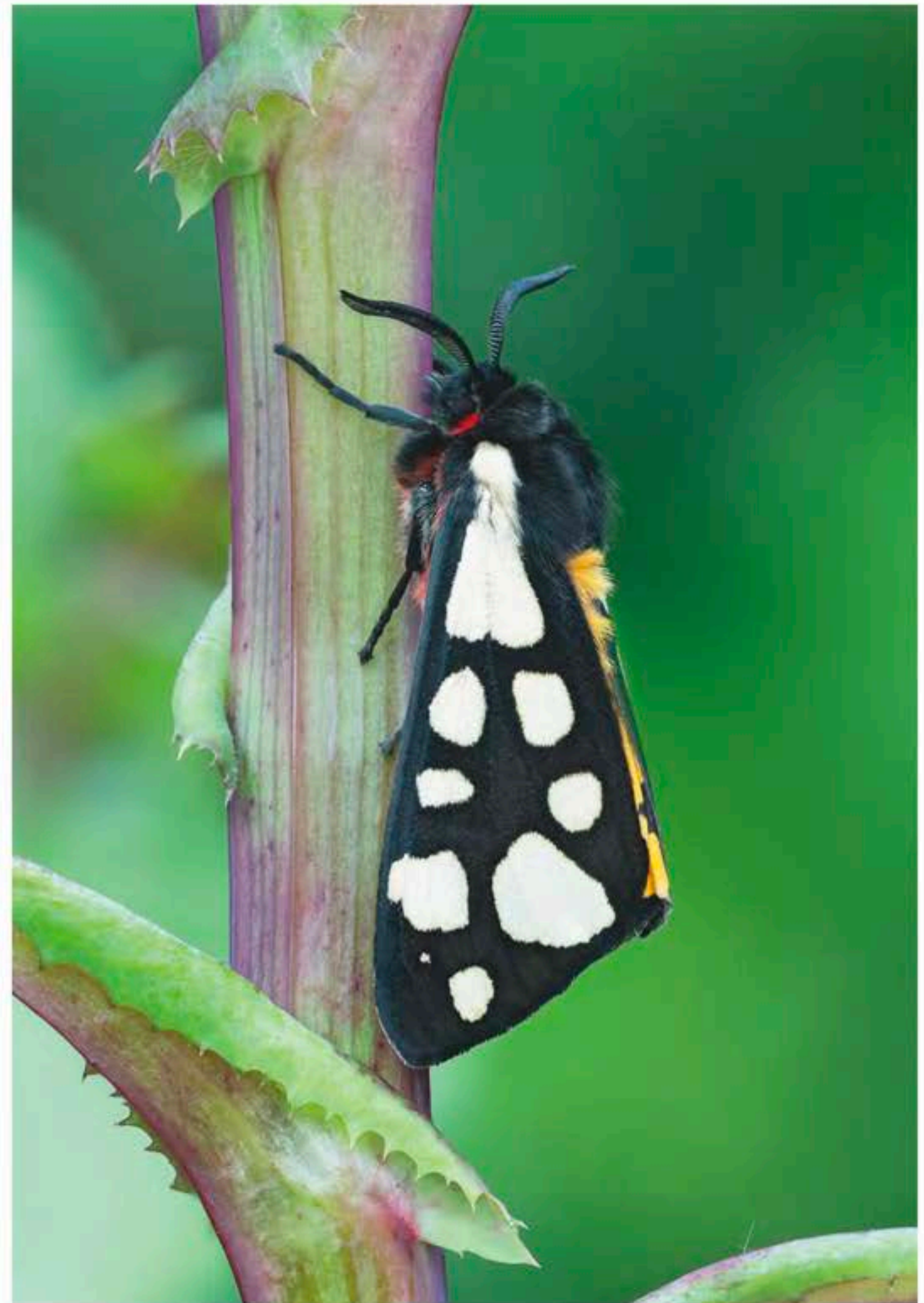


The Castel XQII manual focusing rail. At much higher magnifications it becomes more difficult to achieve continuity in the movement of the rail between images. This is one of the big advantages of using a motorised rail which can deliver precise incremental advancements ensuring there is sufficient overlap between each shot. Also you are having to move the rail manually which can increase the risk of vibration. If you are producing a stack of 50 images that's 50 times you are touching the setup. It is also a slower procedure than using a motorised rail.

been insufficient overlap in the depth of field, or slight movement in the camera setup; this is often visible in the diffused background of the composite.

The second method is mounting the camera assembly onto a manual focusing rail. In this case, you are changing the point of focus by moving the entire camera assembly in small, incremental movements. This is difficult to carry out precisely as you are making the adjustments by manual advancement of the camera assembly which can increase your chances of artifacts and (as already mentioned) insufficient depth of field overlap in some images particularly at higher magnifications. Some cheaper manufactured rails actually increase the likelihood of instability during the process.

One of the advantages of using a motorised rail is continuity and precise incremental movement for each image and the increased stability which reduces many of the issues associated with a manual hands-on approach. This is just a brief overview of the focus stacking technique. You can refer to my latest macro photography publication for more information, or the web which has many articles describing the procedure and the problems that can occur when applying this technique.



Getting the subject in sharp focus from the tip of the near antennae to the far one is difficult to achieve even at a smaller aperture. Providing the insect remains still you can produce successful results.

Subject: Cream-spot Tiger Moth *Arctia villica*

Camera details: Nikon D850, 200mm macro lens at f/8

Subject size approximately: 30mm. Magnification: 0.5X

Image stack number: 12 images

The Novoflex Castel-Micro Focusing Rail



WHY USE AN MOTORISED FOCUSING RAIL?

One of the most frequently asked questions among macro photographers is whether or not (considering the additional cost), a motorised focusing rail will make a significant difference and improve the composite stacks. The answer, without any hesitation, is yes and there are many advantages in doing so. Some of which are outlined below.

1. Not having to manually touch the camera setup during the shooting sequence is a key factor. No matter how carefully you perform the procedure, you are still imparting some movement to the camera and rail while manually performing the task.
2. Manually moving the camera for each shot is, without doubt a tedious task. Speed is one of the main benefits of using a motorised rail.
3. Using a motorised rail eliminates the risk of movement, or vibration as a result of touching the setup during the shooting sequence.
4. An motorised rail delivers a precise and measured incremental

movement; something you cannot achieve when manually carrying out the procedure.

5. A rail reduces the risk of insufficient overlap between shots, causing protentional artifacts in the final composite.
6. You can use wider apertures (maximising on the sweet spot of the lens) with a motorised rail reducing the need to employ longer shutter speeds and increased ISO settings therefore lessening you chance of diffraction.
7. Where a motorised rail really comes into its own is when you are photographing subjects at magnifications approaching and greater than 1:1. Magnifications above life-size is where many problems can occur when working manually. Rotating the focusing ring at these magnifications has little to no effect. Resorting to a motorised rail makes it possible to get consistently good results. When used in combination with other specialised macro lenses it introduces you to a whole new world of subject material to explore at magnifications higher than conventional macro lenses can deliver.



One of the advantages of a motorised rail is being able to photograph at wider apertures since you can specify much smaller incremental movements than you could by employing a manual approach. You are also getting the best in terms of optical quality of the lens. Wider apertures also allows you to have better control of the background behind the subject.

Red-Costate Tiger Moth *Aloa lactinea*

Details: Nikon D850, 200mm macro lens at f/8

Subject size approximately: 30mm. Magnification: 0.5X

Image stack number: 15 images

8. One of the most compelling reasons for using a motorised rail is being able to use wider apertures to reduce the risk of diffraction from stopping the lens down to gain extra depth of field. Using apertures outside the lenses diffraction zone reduces the risk of the loss of sharpness and contrast.

9. Controlled focus stacking also allows you to obtain the exact depth of field you require using the optimum apertures.

WHAT'S IN THE BOX

On opening the box, my first impression of the rail was one of a well-designed, engineered unit; I would, however, expect no less from Novoflex on this front. It was naturally colour coordinated as are all of their products making it easy to identify the brand. To be honest, most of the other rails currently on the market remind me of prototypes rather than completed units; I'm not questioning their capabilities, in terms of performing the task, but on observation, they seem unfinished and may be more suited for studio work since more of their components and structure are exposed, no so with the Novoflex rail; this is just an observation on my part!

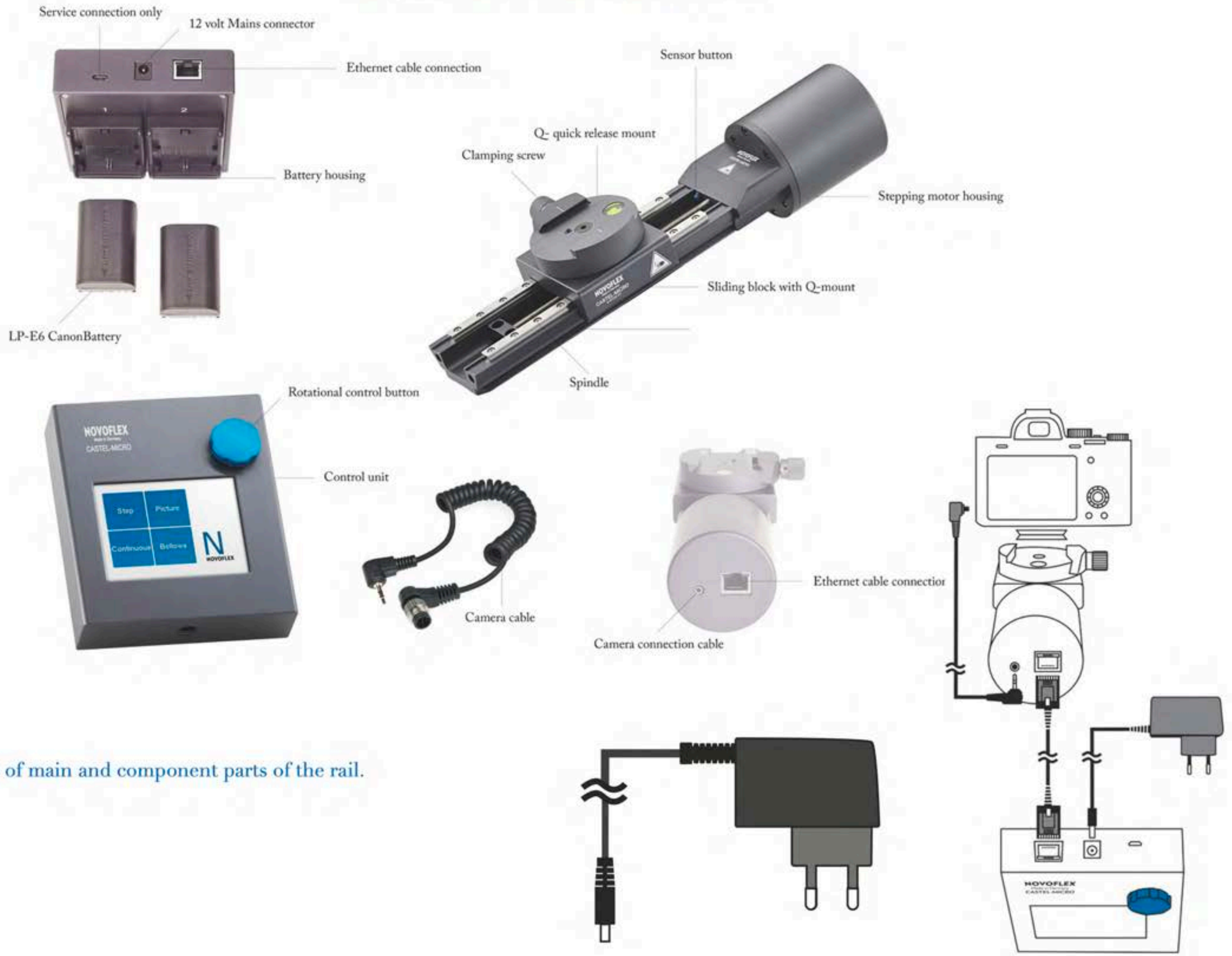
The Castel-Micro comes packed inside a high-quality zipped case, which contains all of the components. The motorised unit is encased inside a sealed metal housing at the rear of the rail and therefore well protected; this leaves very few components exposed to the elements. The rail is not heavy but solid in its construction, which is ideal for fieldwork considering what the average nature photographer carries in a backpack. Included in the case is the control unit, mains adapter and a standard ethernet cable for connection between the rail and control unit.

Depending on which camera brand you use, the rail requires the appropriate connection cable between the camera and the control unit; Novoflex can also supply this. The rail has an Arca Quick Release System and the Q-Mount comes with the unit. The Q-Mount comes in different sizes, with or without anti-twist pins. The rail also allows for positioning the Q-Mount in a horizontal, or linear position if using a long focal length macro and depending on whether your lens has a tripod collar or not! You can also mount the rail directly unto the tripod head if it has an Arca Swiss clamp which in my opinion is a bonus eliminating the need for another mount between rail and tripod head. The enclosed instruction manual (unlike many), is well written and easy to follow.

Novoflex also provided their top of the range ClassicBall 5 II to use in combination with the Castel-Micro. Like the rail, it is a high-spec precision-made piece of equipment. I found no evidence of creep when used with the rail at higher magnifications; something that many other expensive ball heads often suffer from. I will do a separate review of the Classic Ball 5II at a later date.

The Castel-Micro has a maximum travel distance of 100mm (3.94 in) and a minimum repeatable stepping distance of 0.2 μ . Its vertical load

NOVOFLEX CASTEL-MICRO COMPONENTS



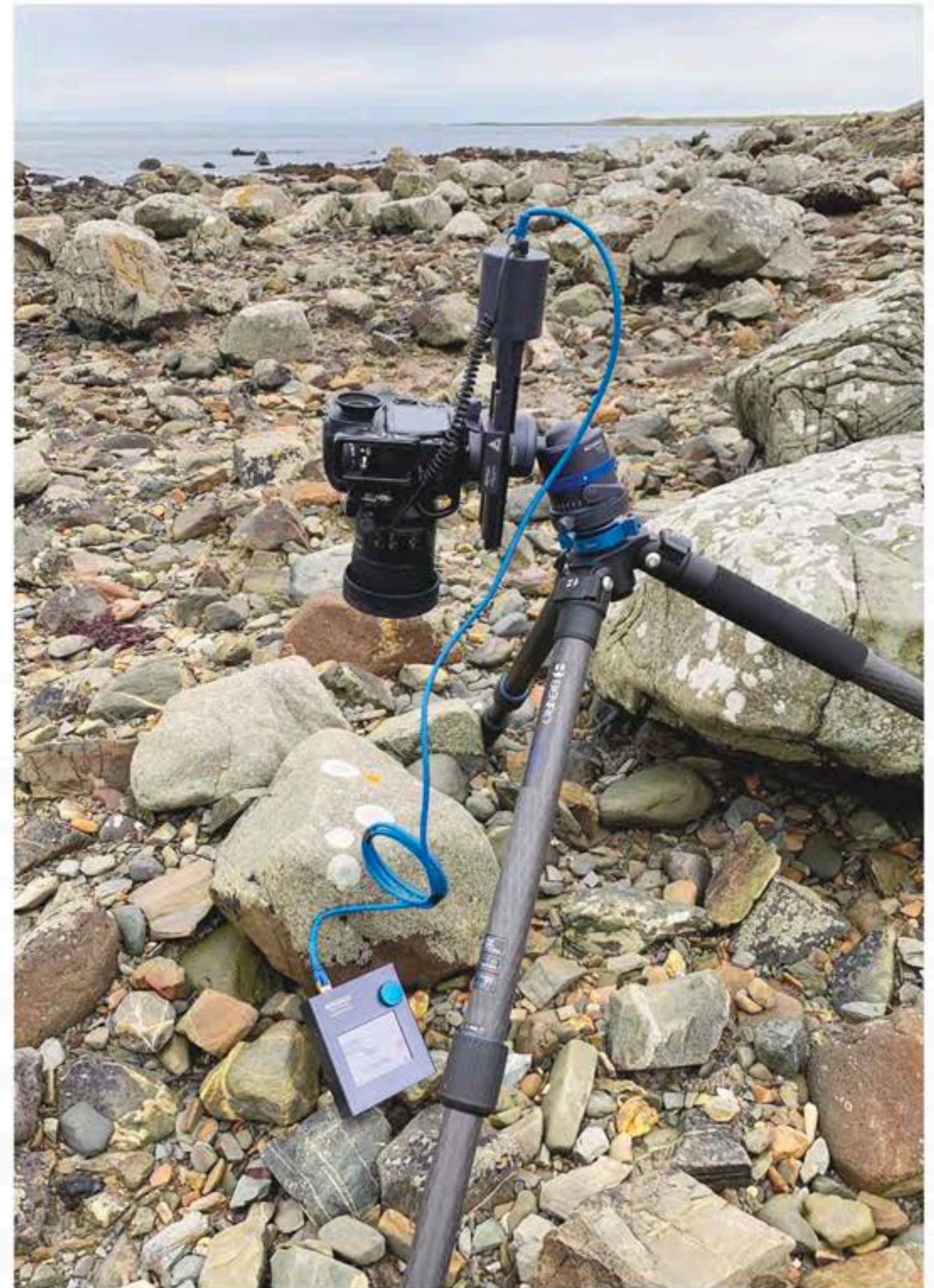


The Novoflex ClassicBall 5 II which is a solid well-designed head. It is more than capable of holding the Castel-Micro complete with camera assembly.

is a maximum of 4 kg (8.8 lbs). Connection of the rail and control unit is quick and simple. Using the Castel-Micro in the field requires you to invest in a couple of Canon LP-E6 batteries and a charger, this gives you the freedom to use the rail independently from a mains connection.

Each time you switch the unit on it performs a calibration test. You are required to keep your finger depressed on the button until this process is complete; a tick becomes visible when finished! During the calibration process, the sliding block returns to the top of the rail where it makes contact with a sensor. It does this each time you start the control unit up; this is the means by which the rail communicates its position with the control box.

To get the best from the Castel-Micro and any macro setup for that matter requires the camera, lens and rail to be mounted on a sturdy tripod with a high spec ball-head. I am using the Benro Mach3 TMA48CLX which is an excellent carbon fibre tripod and extremely stable in the field but not too heavy. The Novoflex ClassicBall 5 II can easily support the entire setup comfortably. I should point out that I shoot 98% of all my photography from a tripod for stability, continuity in framing, focus point and support; I do not want to compromise on quality.



One of the most important factors in ensuring a successful stack is to have solid support while carrying out the procedure. Stability during the shooting process is essential in my opinion. Failure to do so will result in problems with the final stack and increase the risk of more artifacts to deal with in post processing.

The above image shows the Castel-Micro with the Nikon D850 and the 105 micro nikkor shooting lichens on the shoreline.



The Castel-Micro connects to the camera assembly using the Arca Swiss quick release system. The rail can be connected directly to the Q clamp on the ClassicBall 5 II. The dedicated camera connection cable is inserted directly into the rear of the unit. When used in the studio the mains adapter is the power source for the rail. Connection to the control unit is via the blue ethernet cable which communicates information to the rail.

CONNECTION OF THE CAMERA TO THE RAIL AND CONTROL UNIT

The connection of the camera to the rail is best achieved using a quick release system. I would suggest the Arca Swiss, which has a good reputation. Ensure that camera it is correctly engaged in the clamp profile. Connect your dedicated camera cable to the focusing rack. The control unit is connected via an ethernet cable which is provided; this communicates the information to the rail. If using it in a studio setting then the connection is via the mains adapter, but for outdoor use then an LP-E6 battery is required. There is a battery charge status indicator in the calibration and stacking menu, but no facility for charging within the control unit; an external charger is required. The control unit has the facility for two batteries and automatically switches to the second battery when the first is depleted!

OPERATION OF THE RAIL

When you switch the control unit on by depressing the blue button. The rail will perform a calibration check; you will see the sliding block move back to the base of the unit where it makes contact with a small sensor. When complete, a tick will appear. The rail is now ready for

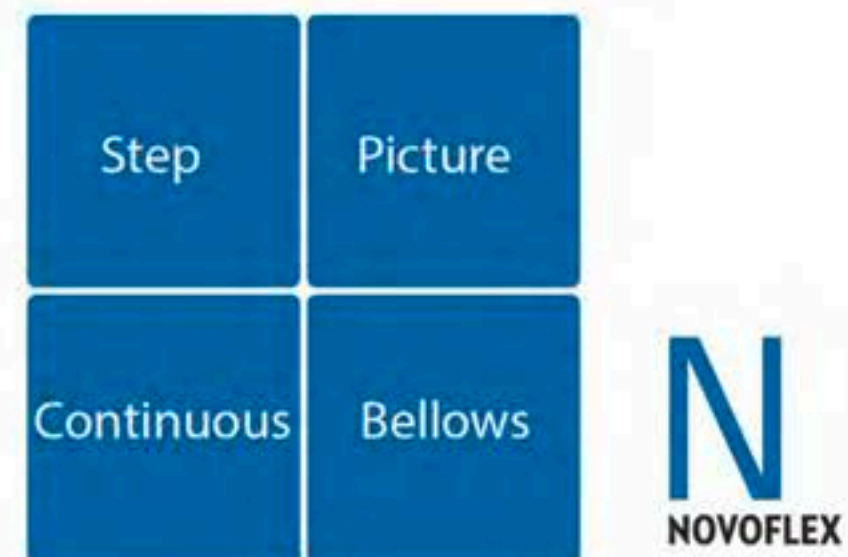
use and the screen will display the four modes. These are Stepp, Picture, Continuous and Bellows Mode. In this overview, I will be discussing the first two modes, which are the most useful for studio and fieldwork. Continuous Mode is essentially for scientific use and not relevant to focus stacking in the field. The Bellows Mode was developed for the bellows attachment (CASTBAL PRO), which is used mainly in the commercial world of product photography. Note, this mode can only be used when the bellows unit is attached!

In all of the modes you will have to enter shutter speed, delay, and also a start and end position, in other words, where your focus point starts and where you want it to end! I will give a brief overview of the first two modes.

Calibration ✓



When the device is switched on you need to press the start button to run the calibration process. A tick appears whrn complete and the rails is ready for use.



The Main menu. From here you can select different modes. Step and Picture modes are the choice when using the focusing rail outside a studio setting.

THE CONTROL UNIT & MENU MODES

First of all, position your rail and camera close to the focus point of your first image. Whichever mode is selected, you have to determine the start and end positions of the stack. The three menus are arranged in order to expedite the process. First, the camera settings, followed by the settings and stacking menus. Novoflex has laid the sequence out very clearly in their instruction booklet. I will give a brief outline below of the procedure.

Professional tip! When selecting your start and end position it is advisable to extend a little before and beyond your points of focus. You can then select exactly where you want to commence and end the stack!

CAMERA SETTINGS MENU

1. **DELAY:** Depress the blue field and enter the delay between exposures you want. I found 1-2 second perfectly adequate in most situations.
2. **MIRROR UP:** If this is ticked you must activate it on the camera as a pulse from the control unit is sent to the camera before triggering the shutter. If your camera has the Live-View then use this and do not tick mirror up?
3. **SHUTTER SPEED:** Enter the shutter speed as indicated on the camera for the correct exposure. The unit needs to calculate the waiting times between exposures based on your selected shutter speed.
4. **DELAY MIRROR UP:** This only appears if the “Mirror up” has been activated. If using Live-View which I recommend then it remains inactive.
5. **LOAD SETTINGS:** You can recall previously saved configurations.

Depending on the Mode selected proceed to the Setting menu and complete the following:

STEP MODE SETTINGS MENU

1. **START:** Press the start field and move the slide block to where you want the stack to begin. Do this by hitting the left and right arrows beside step mode at the bottom of the menu. Once complete, depress the start button again and it turns grey.



Camera Settings Menu. Shutter speed is adjusted by rotating the blue knob.



Settings Menu. Whichever mode you select, you first need to establish the start and finish point of your stack.

2. **END:** Select the end field and it turns blue and fast forward to the end position of where you want the stack to finish. Depress the button again and it turns grey.
3. **STEP IN MM:** Since you are specifying the step length in mm which can be read below the end field, the unit automatically calculates the step size which is indicated in the dark blue field. The steps are then calculated and the number of shots required. The step length should be less than the depth of field. You only want to use a small part of the depth of field to ensure you have sufficient overlap between shots. The easiest way to calculate this is take the step length and divide it by 4 and enter it into the “Step in millimetres”, this will recalculate the number of shots needed. Although this may seem complicated, experimenting is the key and very quickly you get to know the ideal setting for the magnification you are employing. You can alter the step value by pressing the blue button and the number of shots will

DEPTH OF FIELD TABLE

At the permissible circle of confusion diameter of 0.025mm

		F/ Stop								
		<i>f</i> /2.0	<i>f</i> /2.8	<i>f</i> /4	<i>f</i> /5.6	<i>f</i> /8	<i>f</i> /11	<i>f</i> /16	<i>f</i> /22	<i>f</i> /32
Magnification	1:10	11.000	15.400	21.800	30.400	42.800	57.500	77.600	93.600	(Dif)
	1:7,5	6.350	8.900	12.700	17.600	24.800	33.300	44.900	51.600	(Dif)
	1:5	2.990	4.190	5.960	8.290	11.700	15.400	20.500	22.600	(Dif)
	1:4	1.990	2.790	3.970	5.490	7.680	10.300	13.700	15.300	(Dif)
	1:3	1.200	1.670	2.370	3.290	4.610	6.050	7.960	(Dif)	(Dif)
	1:2	0.598	0.834	1.190	1.630	2.270	2.960	3.690	(Dif)	(Dif)
	1:1,5	0.374	0.521	0.470	1.020	1.400	1.810	2.080	(Dif)	(Dif)
	1:1	0.199	0.276	0.392	0.538	0.718	0.880	(Dif)	(Dif)	(Dif)
	2:1	0.074	0.102	0.142	0.189	0.231	(Dif)	(Dif)	(Dif)	(Dif)
	3:1	0.044	0.060	0.080	0.199	(Dif)	(Dif)	(Dif)	(Dif)	(Dif)
	4:1	0.030	0.041	0.054	0.057	(Dif)	(Dif)	(Dif)	(Dif)	(Dif)
5:1	0.023	0.030	0.037	(Dif)	(Dif)	(Dif)	(Dif)	(Dif)	(Dif)	
10:1	0.009	(Dif)	(Dif)	(Dif)	(Dif)	(Dif)	(Dif)	(Dif)	(Dif)	

(Dif) = Diffraction

increase or decrease depending on what value you enter.

Please note. Remember? The step length should be less than the depth of field; refer to the depth of field table until you become familiar with the setup.

STACKING MENU

1. **COUNTDOWN:** Once you have completed the information in the settings menu you can proceed to the Stacking menu. Here you can set a delay using the countdown field if you wish. For example if you think there could be a vibration and you want time to stay clear from the main area then the shooting sequence will only commence when the delay is complete.

2. **SAVE SETTINGS:** Use this field to save the basic setting so it can be used again if you wish.

3. **GREEN PLAY BUTTON:** Press the green button and the

stacking process will commence. The sliding block with the camera will move back to the start of the front focus position and start the sequence.

4. **RED BUTTON:** Use this to cancel the running stack if necessary. It will retain the current settings. Pressing the green button again starts a new stack.

5. **POS:** Located in top right section of the display window, it shows the current position.

6. **DELAY:** Counts down in seconds.

7. **NUMBER OF SHOTS:** A countdown to zero from the designated number of shots so you can see exactly where it is in the sequence.



Stack Settings Menu. Here you can monitor the stacking process, including the progress of the stack sequence.

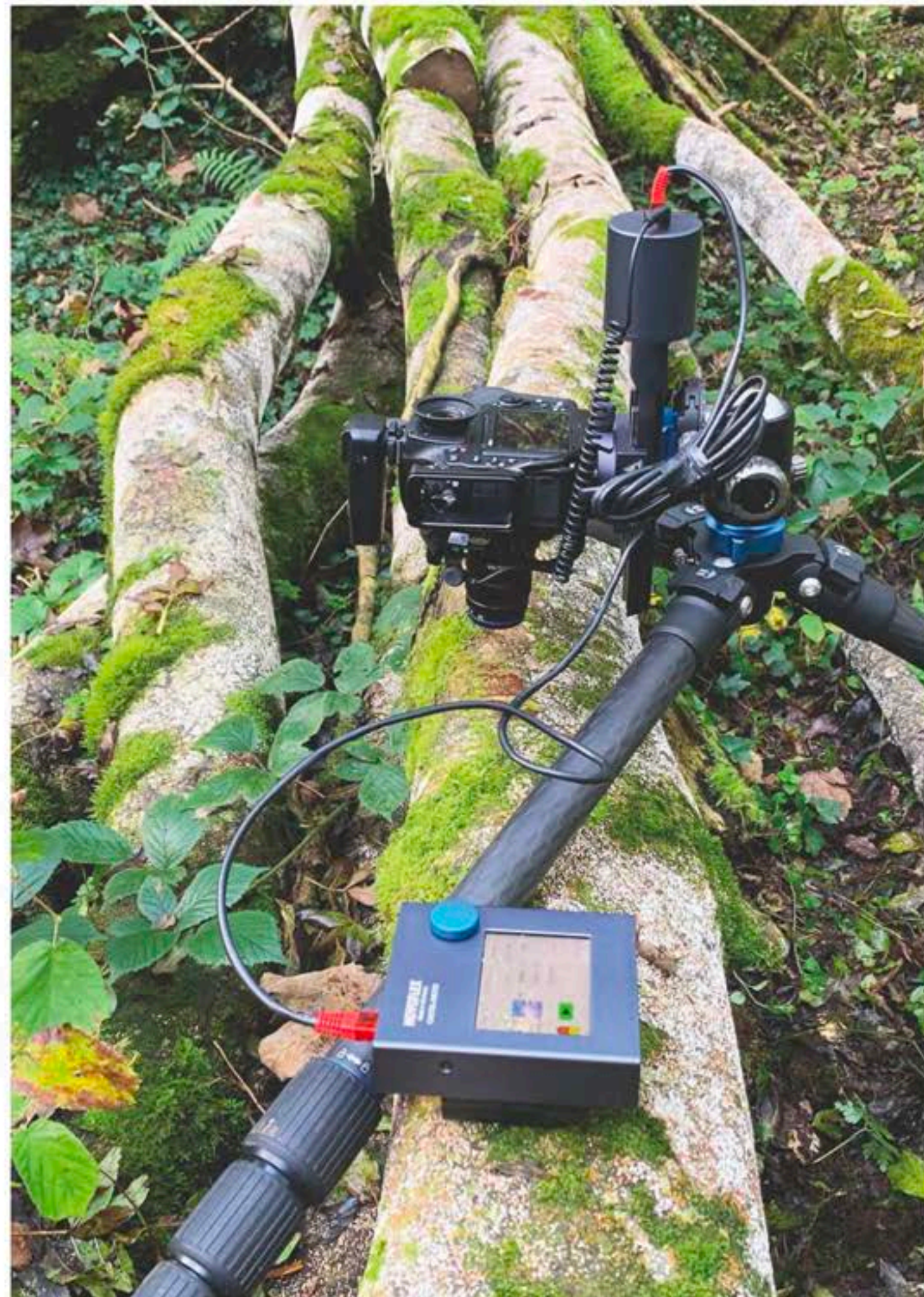
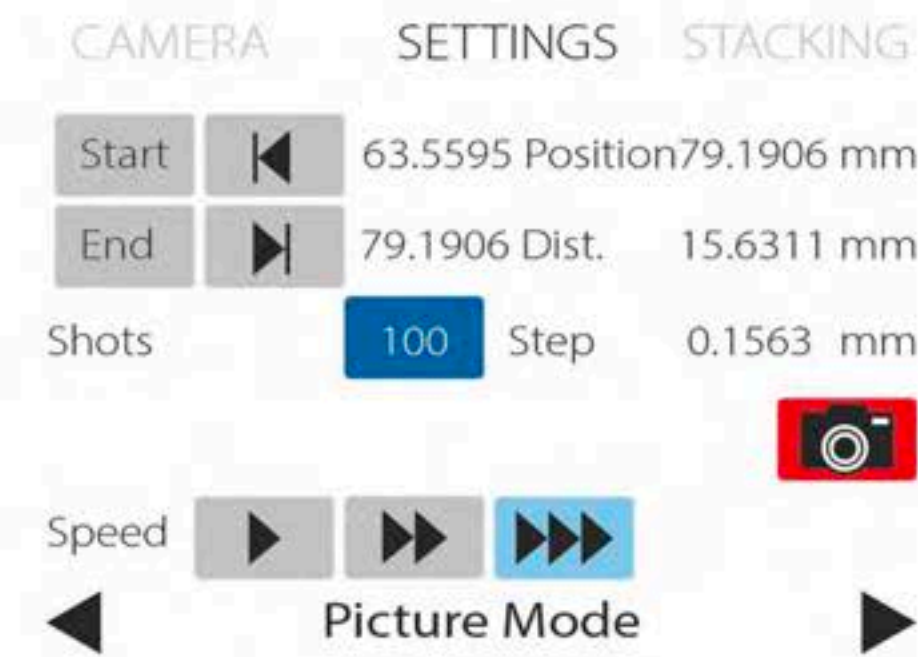
8. **DURATION:** Time needed to complete the stack.

9. **BATTERY WARNING ICON:** Displays current charge left in the battery. It will switch automatically to the second battery when depleted.

Note. If you want to repeat the stack or make changes in the Camera Settings or main menu press the blue rotary knob.

PICTURE MODE

If Picture Mode is selected, all of the other parameters as in Step Mode apply. However, in this case, you are specifying the number of shots you may need e.g. 100. The Step Length is automatically calculated and displayed under Step number in mm, e.g. 0.1563. In this case, you are specifying the number of shots rather than changing the Step value, which affects the number of shots needed.



The rail is quick and easy to set up in the field. You can, if you wish, keep the rail attached to the tripod head leaving only the camera and lens assembly to connect. Using Live-View is the quickest method of framing and focusing the unit once in position.

USING THE FOCUSING RAIL IN THE FIELD

To familiarise yourself with the workings of the rail and to gain an understanding of the different modes, it is a good idea to do some initial experiments in a studio setting before using the rail in the field. The software is cleverly designed, so it does not take long to grasp the main principles of how it works. I found the 'Step Mode' useful in the majority of my situations but, the 'Picture Mode' also works equally well especially when speed is of the essence.

Setting up the rail in the field takes only a few moments. I made a couple of modifications to the inside of my photographic back pack and attached the camera directly to the rail to save time taking it on and off. The rail and camera are then mounted directly onto the Q-clamp on the ClassicBall 5 II head, leaving me only to connect the camera cable. I will discuss lens selection later in the review.

Once the image had been composed using Live-View and the subject in focus, switch on the control unit. It performs a quick calibration check (which only takes a few moments), and the rail is operational. Select the mode of your choice for example 'Step Mode'. The quickest method I found is to defocus the subject a little by rotating the focus ring. Activate the start button and advance the rail to the first point of focus. Hit the start button again and it becomes grey; activate the end button and advance the rail using the arrow keys to the end of your focus point. Press again and it becomes grey. You can read off the distance travelled. At this point you can refer to the guide table in the instruction booklet, or make an adjustment in the step field yourself to ensure you have enough overlap between each shot. I have found that for magnifications up to life-size a value of 0.01-0.05mm is a good starting point and using an aperture of between f/8 occasionally f/11. You can see the number of shots increase or decrease depending on the step adjustment. Advance to the Stacking menu and hit the green arrow. The unit block will then return to the first point of focus and commence the sequence of shots. There is also a facility to save a setting if you think it will be useful in other situations.

One of the real advantages of using the rail for the majority of your focusing stacking subjects is the fact that you do not have to manually touch the lens or camera therefore eliminating the risk of vibration. You may think this is insignificant at lower magnifications, but there is a difference in the quality of the final result in my opinion. Also, if you want to achieve high quality images at much greater magnifications then this is where a motorised rail will take your macro photography to another level. In fact, you can wonder off looking around for other



The top images shows the rail in position and Live-View engaged to establish the framing of the subject. The mode has been selected and the start and end points of the stack have been established. The final result showing the depth of field covered. Everything from the front to the back is in sharp focus.

subjects while it does its business. The unit has the facility for two batteries. If you plan on using it a lot in the field you will need two batteries as one will not be sufficient to sustain continual use.



Slime Mould *Arcyria cinerea*

Where the Castel-Micro really excels is at higher magnifications. When used in combination with the Laowa 2:5-5X macro a new world of subjects becomes possible. The slime mould spheres are approximately 2mm in height. A magnification of 3.5X and 110 images in the stack.

LENS SELECTION

You can of course use any lens of your choosing on the focusing rail, but in my experience working with a dedicated macro is by far the best option. Macro's lenses around 100mm are ideal. These are reasonably light and most are capable of producing magnifications up to 1:1. I use Nikon so I tested the 105 and 200mm micro nikkor's. Both lenses performed extremely well and there were no issues. If you are using a macro with a tripod collar then you need to rotate the Q-Clamp which only takes a moment. I also photographed some subjects using the Nikon 105mm macro in combination with the 2x converter. The results were extremely good increasing the potential to produce images up to twice life-size for those that do not own a higher magnification macro lens! Operating at these magnifications in the field can be challenging but using the Castel-Micro in preference to a manual rail is a game changer in these situations.

Achieving much higher magnifications in the field are of course



The Castel-Micro and Nikon D850 with the Laowa 2:5-5X macro lens, which is small and light as lenses go. It makes the ideal combination when you want to go beyond conventional close-up photography. You enter the realms of true macro photography when you photograph at 1:1 and beyond.

possible. However the same principles apply whether you are shooting with a rail or not. Weather is an important factor. Trying to achieve perfect stacks when the wind is blowing isn't really going to work. You also want to shoot your stacks in stable lighting situations to avoid exposure changes. Subject selection is also important; not everything is not ideally suited to focus stacking. Mobile subjects are naturally challenging to do successfully even when conditions are perfect.

Photographing at life-size and above is where the Castel-Micro excels. Used in combination with a higher magnification macro lens is where you begin to see results which are far more challenging to achieve using a manual setup. For magnifications greater than life-size I use the Laowa 25mm 2:5-5x macro; I already had this lens as part of my kit. It is small, extremely light and easily carried. Being a manual focus lens and diaphragm macro is no disadvantage when working at higher magnifications since you can switch to Live-View which makes the process much easier.

Being able to shoot a up to five times life-size does open up many new possibilities with tiny subjects in the field. The results with this lens are impressive and it is my routine combination when I need magnifications beyond 2:1.

CONCLUSIONS

There is no doubt the Castel-Micro is a well-designed piece of professional equipment. It's apparent from the overall design of the unit that some thought has gone into its fabrication and ease of use. Although it may have been developed initially to meet the needs of the commercial sector; primarily in a studio environment, its versatility when used out in the field is equally impressive.

Once you become familiar with setting modes, using the Castel-Micro in the field is straightforward. The stack sequence is quick since the rail does the work for you. I also found myself using the rail frequently on subjects at lower magnifications where I would normally have used variable focus rotation in the past. Even at lower magnifications, the results were consistently better and with fewer artefacts.

Entering the realms of true macro photography which begins at 1:1 is where you begin to see the real advantage of using the Castel-Micro focusing rail for many of the reasons already stated. It eliminates much of the guesswork and the results are consistent; something that is hard to achieve routinely with a manual approach especially at higher magnifications. Many new subjects that you may not have considered in the past become possible.

I am impressed with the Castel-Micro and its ease of use in the field. It has, in many ways, exceeded my expectations. Specialised equipment is never cheap, but if you plan on doing a lot of macro photography and are serious about the work you do then having a motorised rail as part of your photographic kit is an absolute must in my opinion.

Phalaenopsis Orchid Hybrid

Close-up images of the column which forms part of the lip of the orchid.

Camera details: Nikon D850, Laowa 2:5-5X macro lens at f/5.6.

Subject size approximately: 10mm. Magnification: 2.5X

Image stack number: 90 images

Mode: Step Mode



Further Information



Name: Phalaenopsis Orchid Hybrid
Camera details: Nikon D850, Nikon 105mm micro nikkor, + 2X converter, f/8
Subject size approximately: 20mm. Magnification: 1X.
Image stack number: 55 images
Mode: Step Mode

Further information on the Castel-Micro can be obtained through Speed Graphic who are the UK distributors for Novoflex products, or Novoflex Germany. Contact details are as follows:

Speed Graphic

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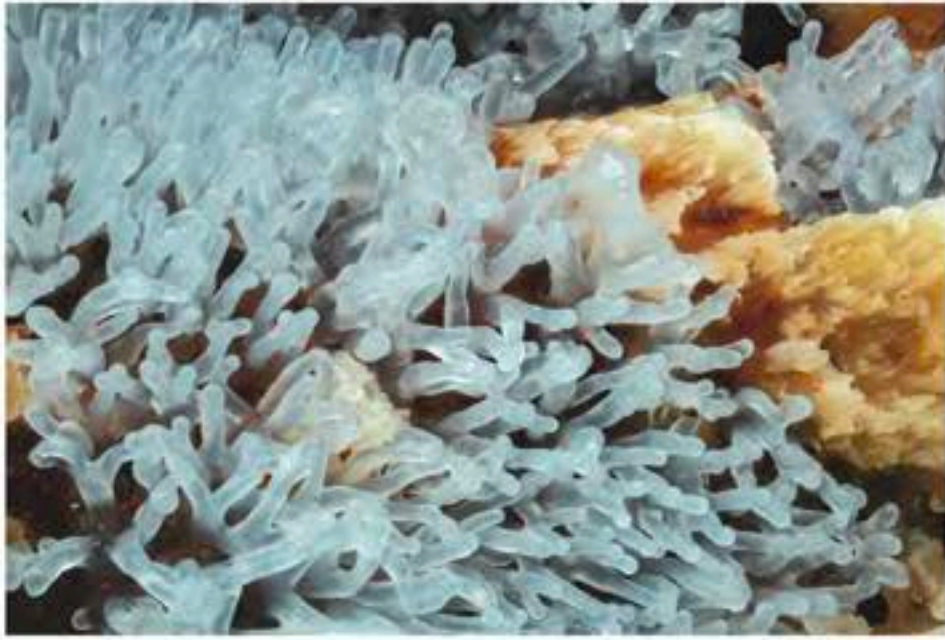
Castel-Micro Gallery



Name: Pansy Viola species
Camera details: Nikon D850, Laowa 2:5-5X macro lens at $f/5.6$.
Subject size approximately: 5mm. Magnification: 3.5X
Image stack number: 115 images
Mode: Step Mode

The following images have been photographed using the Castel-Micro and different combinations of lenses and converters to evaluate the quality of results. I have provided information as best I can as to the number of images in a stack, the lens used, also the approximate magnification and size of the subject and the mode used to capture the result.

Gallery one



Name: Coral Slime Mould *Ceratiomyxa fruticulosa*
Details: Nikon D850, Laowa 2:5-5X macro lens f/5.6.
Subject size: 8mm. Magnification: 2.5X
Image stack number: 85 images
Mode: Step Mode



Name: Common Wasp *Vespula vulgaris*
Details: Nikon D850, Laowa 2:5-5X macro lens f/5.6.
Subject size approximately: 10mm. Magnification: 2.5X
Image stack number: 90 images
Mode: Step Mode



Name: Lichen *Cladonia coccifera*
Details: Nikon D850, Laowa 2:5-5X macro lens f/5.6.
Subject size approximately: 5mm. Magnification: 3X
Image stack number: 95 images
Mode: Step Mode



Name: *Cyclamen hederifolium*
Details: Nikon D850, Laowa 2:5-5X macro lens f/5.6.
Subject size approximately: 10mm. Magnification: 2.5X
Image stack number: 100 images
Mode: Picture Mode



Name: Slime Mould *Arcyria ferruginea*
Details: Nikon D850, Laowa 2:5-5X macro lens f/8.
Subject size approximately: 10mm. Magnification: 1.5X
Image stack number: 55 images
Mode: Step Mode



Name: Lemon Disco Fungus *Bisporella citrina*
Details: Nikon D850, Laowa 2:5-5X macro lens f/5.6.
Subject size approximately: 8mm. Magnification: 3.5X
Image stack number: 115 images
Mode: Step Mode

Gallery two



Name: Silkmoth *Neoris huttoni* eye spot on wing
Details: Nikon D850, 105mm micro nikkor, + 2X converter, f/8.
Subject size approximately: 10mm. Magnification: 2X
Image stack number: 50 images
Mode: Step Mode



Name: Herb Robert *Geranium robertianum*
Details: Nikon D850, Laowa 2:5-5X macro lens f/5.6.
Subject size approximately: 3mm. Magnification: 3.5X
Image stack number: 135 images
Mode: Step Mode



Name: *Gonimbrasia krucki*
Details: Nikon D850, 105mm micro nikkor + Raynox 250mm macro conversion lens, f/5.6.
Subject size approximately: 13mm. Magnification: 1.5X
Image stack number: 55 images
Mode: Picture Mode



Name: Snowy Disco Fungus *Lachnum virgineum*
Details: Nikon D850, Laowa 2:5-5X macro lens f/5.6.
Subject size approximately: 10mm. Magnification: 3X
Image stack number: 95 images
Mode: Step Mode



Name: Cat's-eyed Emperor Moth *Aurivillius aratus*
Details: Nikon D850, 105mm micro nikkor, + 2X converter, f/8.
Subject size approximately: 10mm. Magnification: 2X
Image stack number: 75 images
Mode: Step Mode

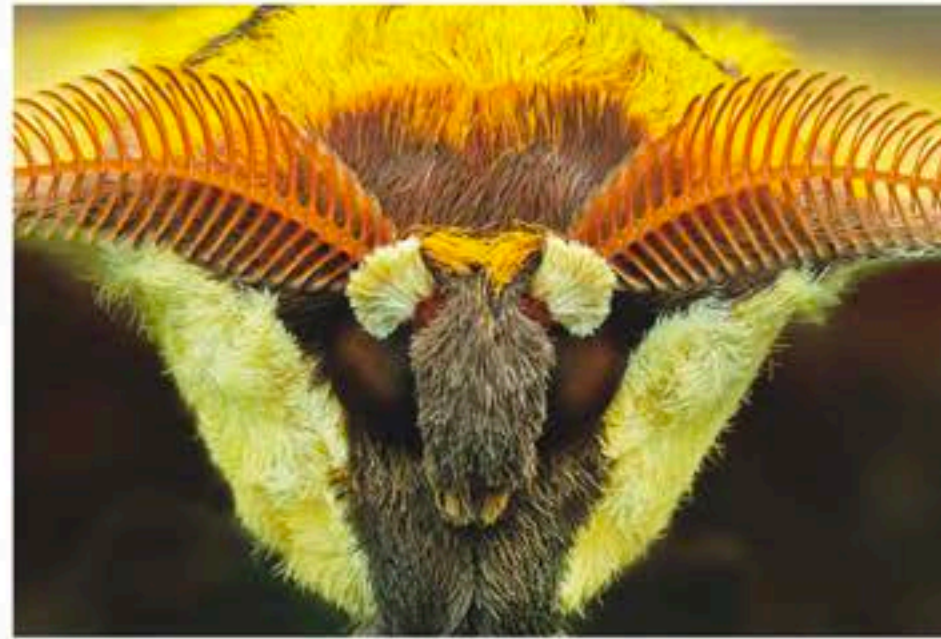


Name: Metatrachia species with fungus
Details: Nikon D850, Laowa 2:5-5X macro lens f/5.6.
Subject size approximately: 2mm. Magnification: 3.5X
Image stack number: 135 images
Mode: Step Mode

Gallery three



Name: Rough Periwinkle *Littorina saxatilis*
Details: Nikon D850, 105mm micro nikkor, + 2X converter, f/8.
Subject size approximately: 15mm. Magnification: 0.5X
Image stack number: 20 images
Mode: Step Mode



Name: Cat's-eyed Emperor Moth *Aurivillius aratus*
Details: Nikon D850, Laowa 2.5-5X macro lens f/5.6.
Subject size approximately: 10mm. Magnification: 2.5X
Image stack number: 75 images
Mode: Step Mode



Name: Coral Spot Fungus *Nectria cinnabarina*
Details: Nikon D850, 105mm micro nikkor, + 2X converter, f/8.
Subject size approximately: 3mm. Magnification: 1.5X
Image stack number: 40 images
Mode: Step Mode



Name: Common Wood Louse *Oniscus asellus*
Details: Nikon D850, 105mm micro nikkor, + 2X converter, f/8.
Subject size approximately: 10mm. Magnification: 1.3X
Image stack number: 45 images
Mode: Step Mode



Name: Acorn Barnicle *Semibalanus-balanooides*
Details: Nikon D850, 105mm micro nikkor, + 2X converter, f/11.
Subject size approximately: 13mm. Magnification: 1X
Image stack number: 65 images
Mode: Step Mode



Name: Blotched Emperor *Lobobunaea phaedusa*
Details: Nikon D850, 105mm micro nikkor, + 2X converter, f/8.
Subject size approximately: 15mm. Magnification: 1.4X
Image stack number: 60 images
Mode: Step Mode

Gallery four



Subject: Rough Periwinkle *Littorina saxatilis*
Details: Nikon D850, 105mm micro nikkor, + 2X converter, f/11.
Subject size approximately: 10mm. Magnification: 0.5X
Image stack number: 25 images
Mode: Picture Mode



Subject: Lichen *Xanthoria parietina*
Details: Nikon D850, 105mm micro nikkor, at f/11.
Subject size approximately: 25mm. Magnification: 1X
Image stack number: 30 images
Mode: Step Mode



Subject: Southern Atlas Moth *Epiphora bauhiniae*
Details: Nikon D850, Laowa 2:5-5X macro lens f/5.6.
Subject size approximately: 7mm. Magnification: 3.5X
Image stack number: 130 images
Mode: Step Mode



Subject: Giant House Spider *Eratigena atrica*
Details: Nikon D850, 105mm micro nikkor, + 2X converter, f/8.
Subject size approximately: 10mm. Magnification: 2X
Image stack number: 90 images
Mode: Step Mode



Name: Blotched Emperor *Lobobunaea phaedusa*
Details: Nikon D850, Laowa 2:5-5X macro lens f/8.
Subject size approximately: 8mm. Magnification: 2.5X
Image stack number: 90 images
Mode: Step Mode

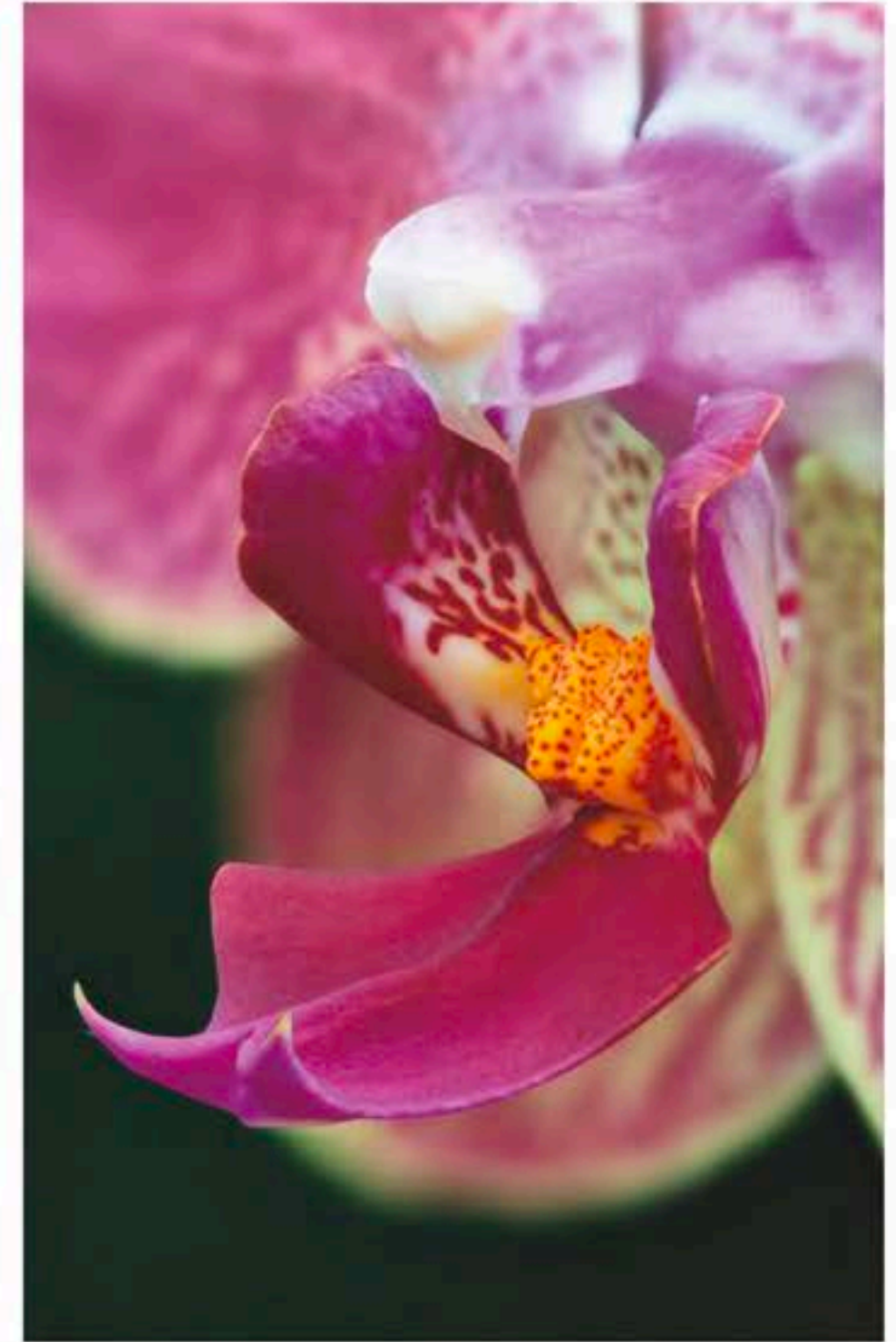
Gallery five



Subject: Coral Slime Mould *Ceratiomyxa fruticulosa*
Details: Nikon D850, Laowa 2:5-5X macro lens f/8.
Subject size approximately: 8mm. Magnification: 3X
Image stack number: 95 images
Mode: Step Mode



Subject: Clustered Bonnet *Mycena inclinata*
Details: Nikon D850, 105mm micro nikkor, at f/8.
Subject size approximately: 60mm. Magnification: 0.3X
Image stack number: 20 images
Mode: Step Mode



Subject: Phalaenopsis Orchid Hybrid
Details: Nikon D850, 105mm micro nikkor, at f/11.
Subject size approximately: 30mm. Magnification: 0.5X
Image stack number: 55 images
Mode: Step Mode

Acknowledgements

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Robert Thompson
PHOTOGRAPHY



Name: *Mycena* species
Details: Nikon D850, 105mm micro nikkor, at f/11.
Subject size approximately: 50mm. Magnification: 0.3X
Image stack number: 30 images
Mode: Step Mode

Robert Thompson is a professional freelance natural history photographer, author and naturalist. He is a Fellow of the Royal Photographic Society and the Irish Photographic Federation; an acclaimed macro specialist in the UK and author of a number of books on natural history and photography. His work is widely published in the UK, Ireland and internationally, with numerous photographic credits in a wide variety of publications and other media sources. He is a frequent writer and contributor to the photographic press and other natural history publications.



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