

# The Novoflex Bellows System

*A Field-based Review*



Robert Thompson



# NOVOFLEX BELLOWS SYSTEM



*The BALPRO-1 with the Nikon Z7 II and the Z MC 105mm f/2.8 VR S macro lens. With the Nikon Z adapter system you have complete automation between camera and lens. You also have the capability of achieving magnifications greater than 4:1.*

## OVERVIEW

There are many ways to enter the intriguing world of macro photography, but the normal approach is by using a dedicated macro lens. However, if you don't own one, extension tubes and close-up lenses are the most frequently used alternatives. One of the downsides of using extension tubes is having to assemble and disassemble them to achieve the desired magnification; this can be a real inconvenience in the field. Also, the reproduction level is not continuous, but dictated by the extension tubes configurations, therefore you cannot achieve a continuous, variable magnification. Close up lenses are another option, but most are limited to lower magnifications also, the optical quality of some of these lenses are not on par with a dedicated macro lens, extension tubes or bellows.

Historically, extension bellows were used generally by the macro fraternity for routine photomacrography. They were a popular solution pre-digital for obtaining magnifications above life-size (1:1). During the analogue era, some major camera manufacturers included extension bellows in their macro line-up. Novoflex introduced an Auto bellows back in 1967. It featured automatic diaphragm release and subsequently they added open aperture metering which eliminated the need for a double cable release mechanism. However, most others were manual and required the stop-down metering technique. Nikon's PB-6 and Canon's FD Auto bellows were also popular during that time and had the capability of retaining some functions such as, open aperture viewing via a double cable release system. Post-digital, they are less often used for several reasons, the most important being, changes in equipment priorities with virtually all the leading camera manufacturers who dropped them and other important accessories

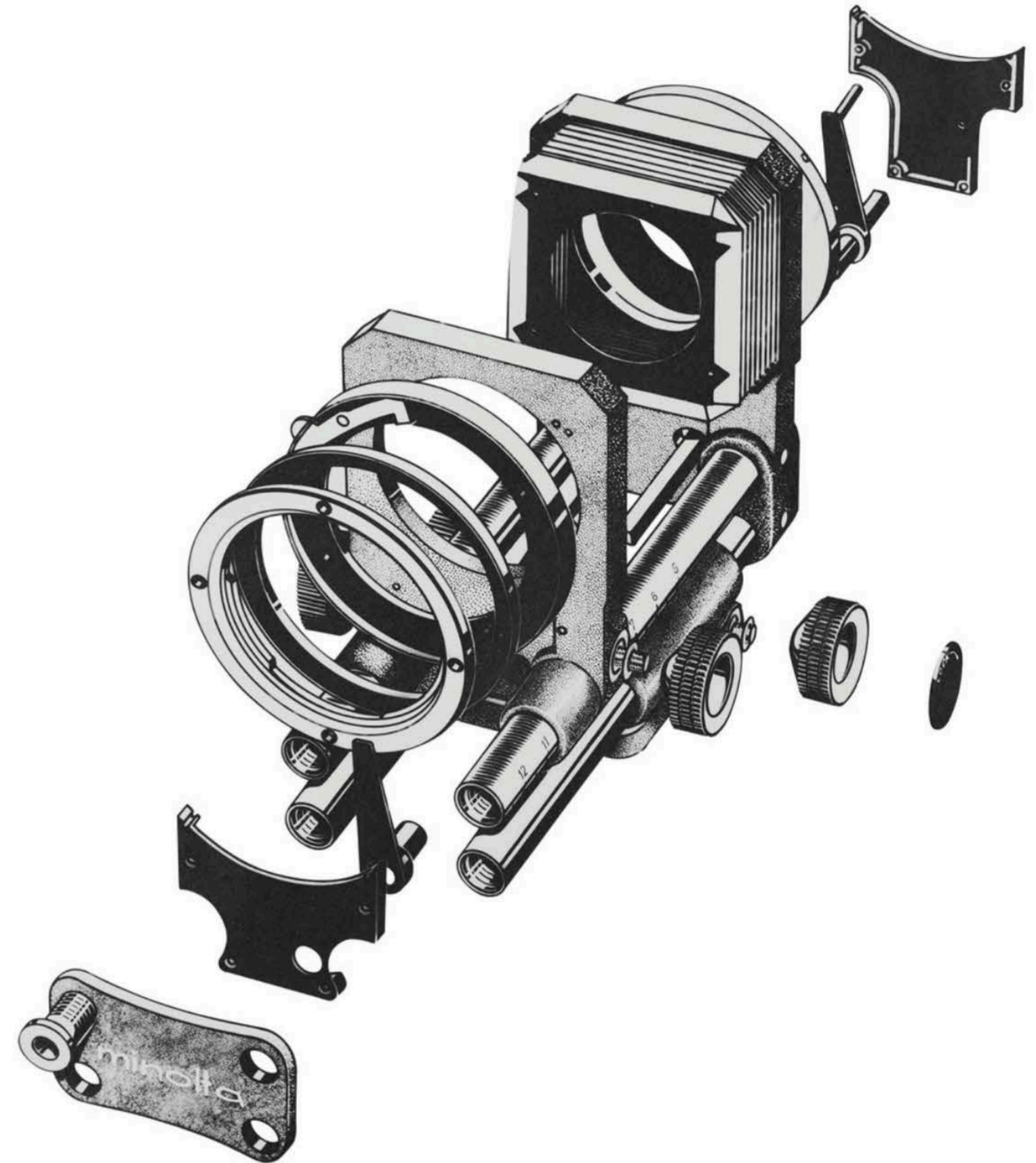




*The ground-breaking Novoflex original Auto Bellows that was developed back in 1967 for the Minolta SR T101. It was the first bellows to have complete automation and eliminate the need for a double cable release system. It featured an automatic diaphragm release and open aperture metering. In 1969 it became available under the Novoflex brand for other cameras. Novoflex holds the registered patent for the bellows design.*

from their macro line ups. Providing no digital alternative left a huge gap in the photographic industry for photographers who need to achieve magnifications beyond 1:1 (life-size).

There is an assumption among many of the major camera brands that providing a range of macro lenses is more than adequate for the majority of photographers, and perhaps that's true. However, in shifting their priorities, the professional industry has been left to resolve the shortfalls in specialised equipment themselves. It is also true that this area in macro photography is a niche market therefore, the R+D does not justify the return when the market in this area is small. Thankfully Novoflex and companies like them fulfil an essential role having taken it upon themselves to research, develop and support the photography industry by providing a wide range of specialised equipment that is manufactured to very high standards.



*The original 3D drawing from the Novoflex archives for the design of the Auto Bellows for the Minolta SR T101 camera. Novoflex was the only company back then to manufacture a fully automatic bellows. Subsequently, bellows units from the company became available for other camera brands. Having a auto bellows then made the process of capturing higher magnification images less challenging. Using bellows pre-digital in a manual mode was always more time-consuming. Initial tests had to be carried out to ensure your exposures were correct. Unlike today you did not have the advantage of seeing your results immediately. However, having open aperture viewing was a great advantage allowing you to see the subject more clearly rather than having to employ stop-down metering.*

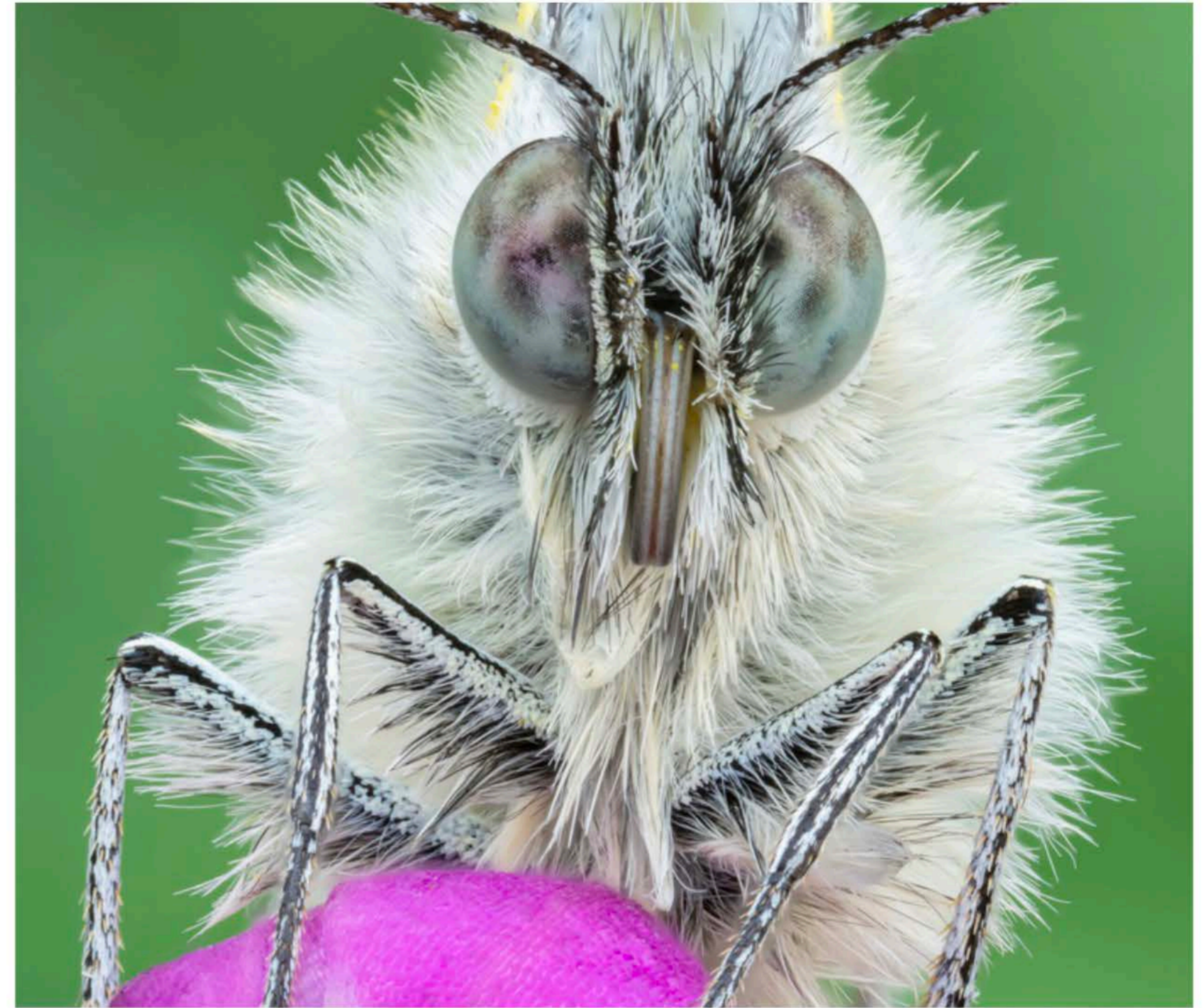




*Lisianthus* species

*Using conventional lenses as in this case the Nikon Z 24-70mm f/4 in reverse on either the BAL-F or BALPRO 1 opens up a whole new range of subjects to explore. Normal lenses are converted in to macros when reversed delivering excellent optical quality with the ability to achieve magnifications around 4:1, depending on the lens used.*

Bellows is essentially a large variable extension mechanism that is placed between the camera and lens. It works in a similar principle like the bellows on an accordion, expanding as you turn the knob, unlike a macro lens where specific internal elements move to achieve focus and magnification. Using conventional lenses in combination with a bellows unit opens up a whole new world of subjects and possibilities with the ability to photograph and achieve magnifications well beyond those of



Green-veined White *Pieris napi* photographed at 2:1

*Photographing resting insects can be challenging especially when having to work at very close distances. It's often a case of hit and miss. Sometimes you need several attempts before you get the result you want. In this case it was late evening and temperatures were cool and the butterfly had settled for the night. The Castel-Micro with the bellows and Nikon 50mm El enlarger lens gave an excellent result producing a magnification of approximately 2:1.*

a dedicated macro. One of the major advantages of using bellows is you have continuous, variable magnification and much greater versatility than extension tubes.

As a professional natural history photographer, I have to cover a wide range of subjects. Macro is one of my specialist fields, while a lot of it is routine and can be covered with a range of macro lenses. Some of it cannot and requires additional equipment. Over the last couple of years, I found myself having to do a lot more macro photography which involves greater magnifications beyond 1:1. Some of it is related to specific photographic commissions and projects that I had undertaken. I had been using other techniques (which I describe in my latest macro photography book) to achieve this but found myself



looking for a more systematic approach with more predictable outcomes. I was given the opportunity a while back to test the bellows systems manufactured by Novoflex, the BAL-F, which is used mainly for the majority of 35mm camera systems, and the larger universal BALPRO 1, which is primarily aimed at medium format users, although it can easily accommodate both camera formats.

Novoflex is a well-respected German manufacturer of high-quality photographic equipment. They are known throughout the industry for their expertise in the design and the fabrication of many important camera accessories, especially in the field of macro. The company have designed a series of bellows systems that are compatible with a wide range of camera brands preserving all of the automatic functions via the appropriate adapters. The automatic bellows system preserves the electronic transmission of exposure, aperture and metadata etc. The information given here is based on my experience of using both bellows systems in the field for some time now and the combination of different lenses that I have used with them to achieve higher magnifications. Having used and reviewed many other Novoflex products, I knew when it comes to quality and functionality, the standard of manufacture would be on par with their other products; I was not disappointed, the engineering and the precision in both units is extremely high.

I had, over the years experimented with a couple of independent brands, but I was never happy, the build quality of the products and the results were often a reflection of the shortcomings of the unit itself. You can, of course, find cheap bellows on the internet however, I must say that these are, in my opinion, not suitable due to their flimsy design and lack of functionality in many aspects. If you are serious about your work then buying into the right system will save you a lot of grief and hassle, allowing you to focus on achieving great imagery knowing that the equipment you are using will deliver the results you expect.

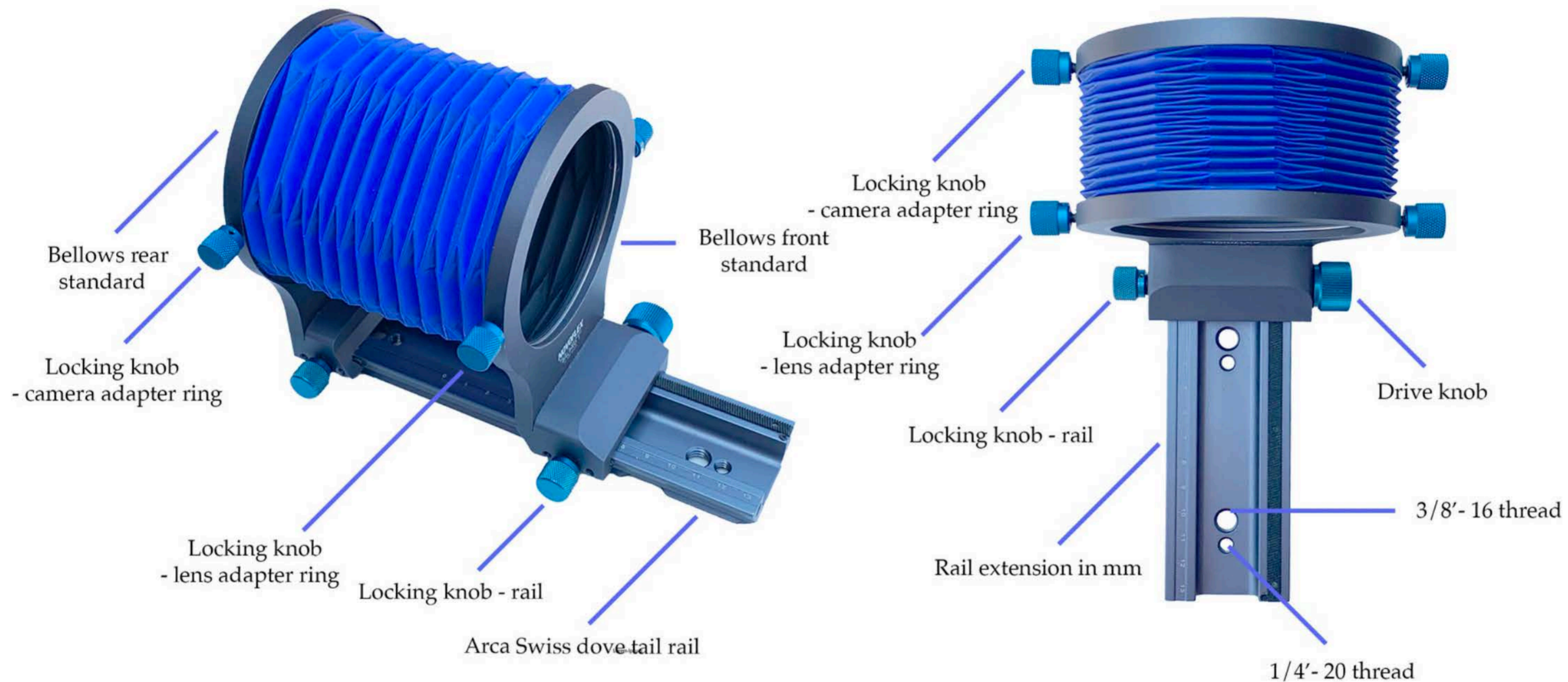
*Bee Orchid *Ophrys apifera**

*The BALPRO-1 bellows with the Castel XQ II focusing rail, the Nikon Z7 II, and the Nikon EL 50mm enlarging lens. The camera assembly is supported on the PRO75 tripod and MagicBall. I wanted to photograph in close-up the tiny emerging pollina that were beginning to drop from the column. Magnifications up to around 2:1 are possible in the field with a conventional focusing rail if conditions are calm. Beyond that an electronic rail is a better option. It's important that there is no free play in your setup otherwise it can compromise your results. The final image is illustrated on page 17.*





## DIAGRAM OF BALPRO BELLOWS



*Diagram of the major component parts of a typical bellows unit. One of the advantages of the Novoflex units is the long dovetail Arca Swiss slide, which greatly helps to position your setup close to where you want focus to begin. Novoflex Arca Swiss compatible mounts adhere to the UniQ/C standard as agreed by a number of German brands including, Berlaebach, Cullman, FLM, Linhof and Novflex, which ensures complete and accurate cross-compatibility between their products. Something which claims to be Arca Swiss compatible may not fit precisely; it's a common problem which I have experienced many times in the past. A poorly fitting clamp is likely to compromise your stability when working at higher magnifications.*

### Bellows Information

Here are some advantages and points you should consider when purchasing a bellows unit.

(1) To get the best from using bellows you need to mount them on a sturdy tripod; this is a must, in my opinion, to achieve continuity in your results; there are no shortcuts!

(2) A greater range of extension is possible with bellows than with any other piece of equipment.

(3) Bellows give you the ability to produce magnifications well beyond

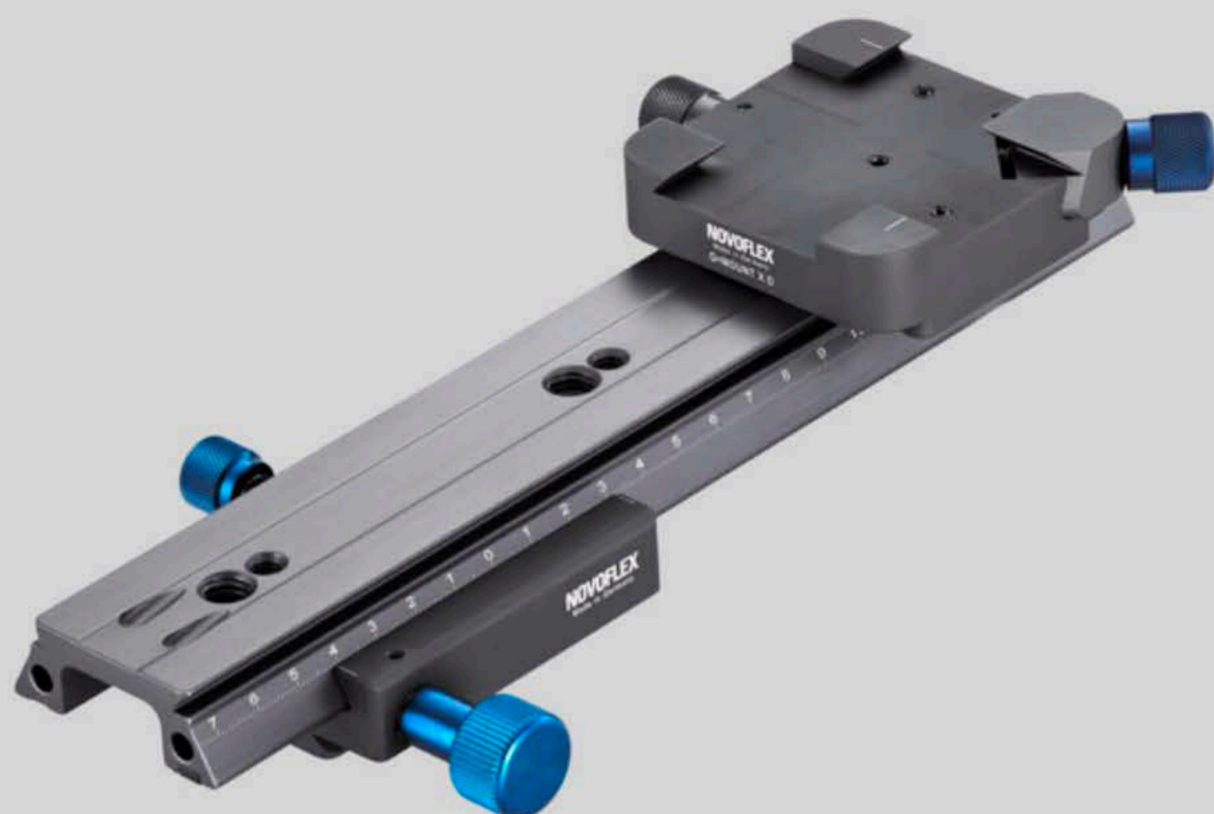
life-size. Depending on the lens being used, you can achieve magnifications around 4:1.

(4) Continuous magnification is possible with bellows, unlike extension tubes.

(5) When bellows are used with a focussing rail, they are easier to position and focus.

(6) Focus stacking to extend the zone of sharpness is a more straightforward process with bellows especially when using a





separate focusing rail. It also means that the step distance can be controlled precisely for each shot.

(7) Unlike extension tubes, bellows provide continuous magnification throughout the rails range.

(8) Bellows in combination with a precision focusing rail makes it easier to achieve more accurate adjustments at higher magnifications. Also, the rail moves the camera and the lens assembly together as one unit while keeping the magnification constant.

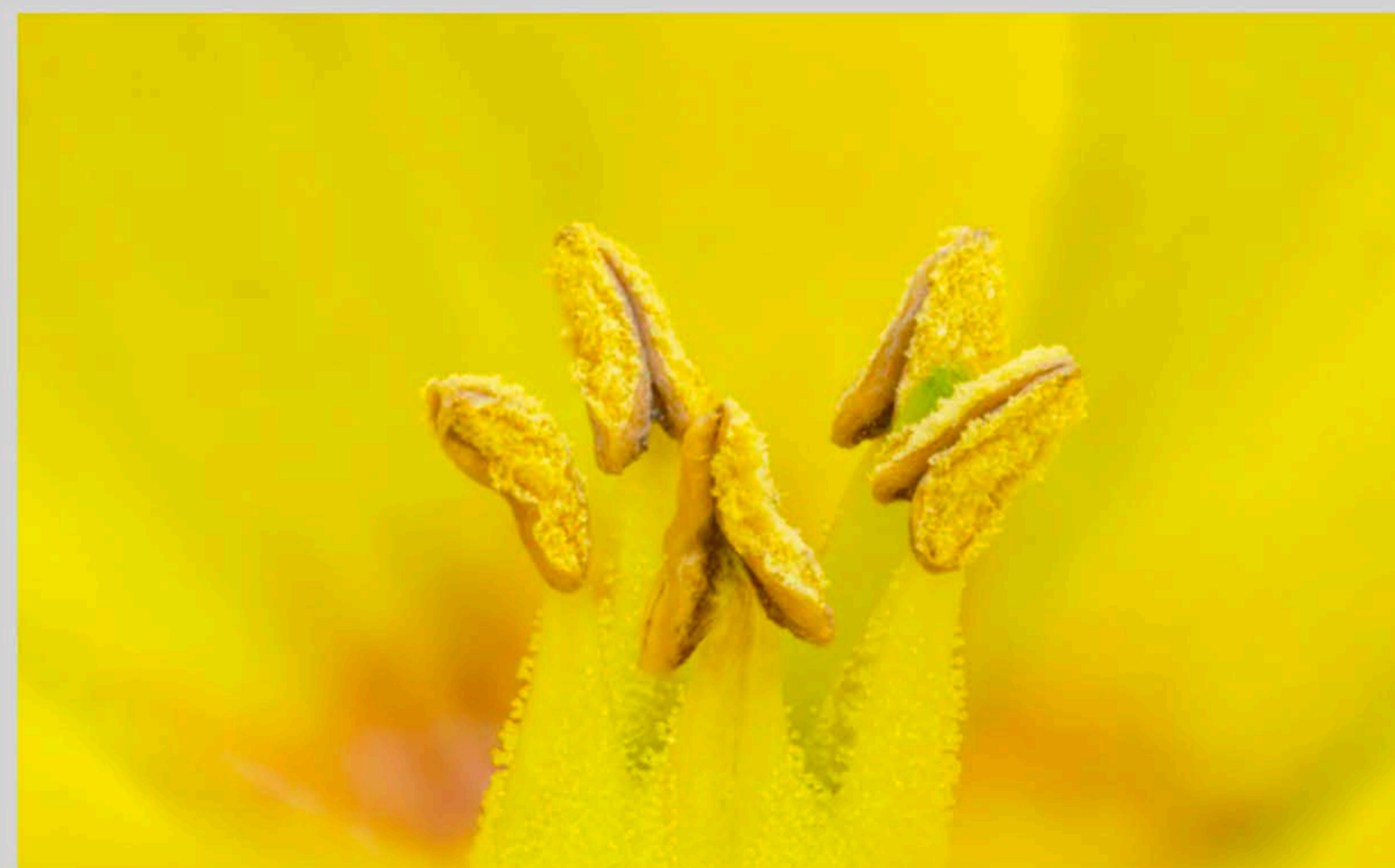
(9) Using a focusing rail with bellows eliminates the constant moving of the tripod to establish focus.

(10) Bellows are more beneficial for those who do a lot of focus stacking.

(11) Ideally both the front and rear standards of the bellows unit should be able to move, this ensures that lenses with a short working distance can be used without the rail interfering with the subject. Or, the front and back standards should be able to accommodate either the lens or camera body.

(12) Bellows should have a rotatable lens mount to accommodate both landscape and portrait orientations.

(13) Focus should also be smooth and precise by rotating the knob. If you see vibration in your setup each time you touch the unit then it's not suitable for serious macro photography.

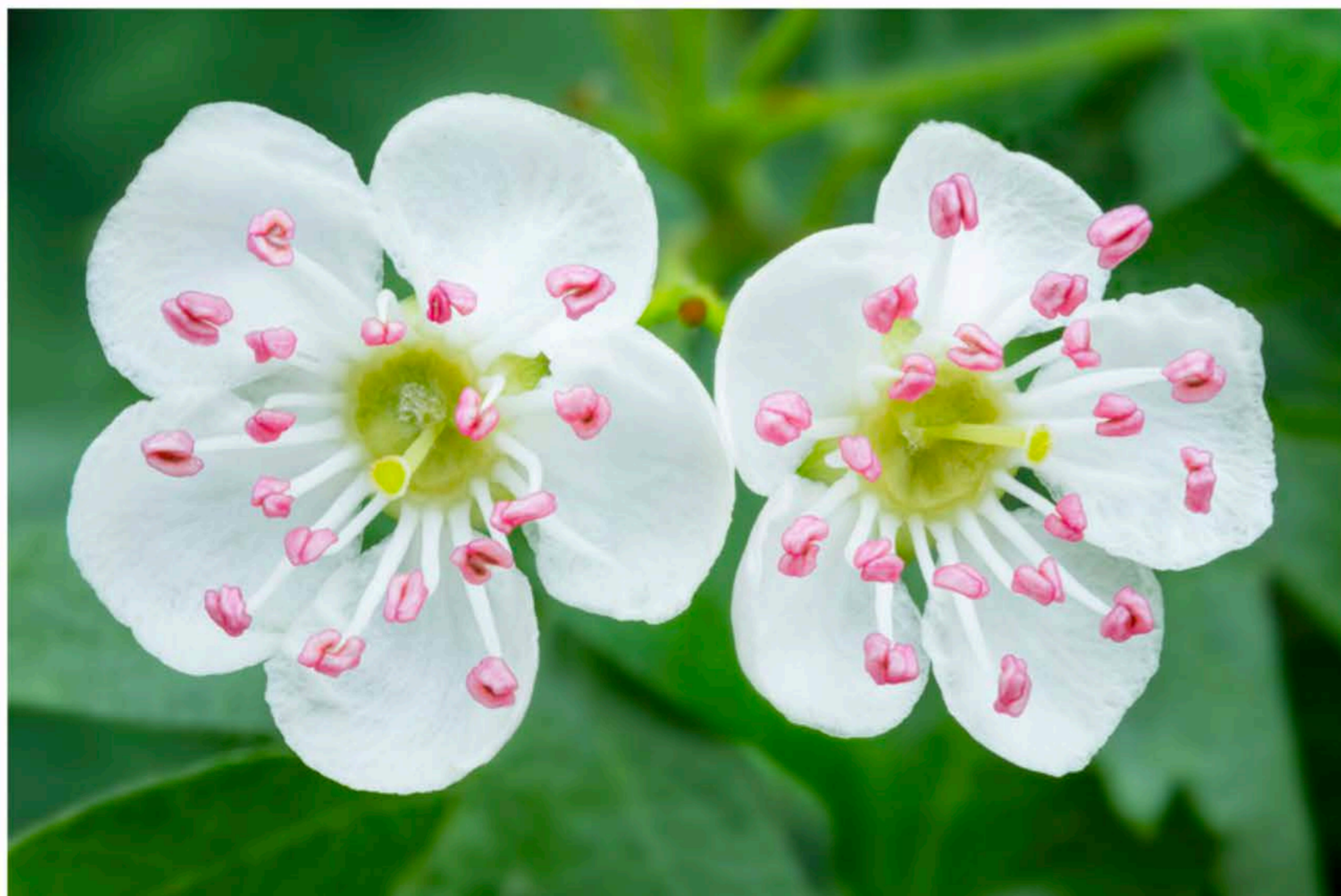


Top left  
*The Castel XQ II focusing rail, which is an ideal combination with any of the bellows. It's solid, stable and allows for precise advancements when focus stacking*

Top right  
*BALPRO-1, Nikon Z7II, 90mm APO-DIGITAR on the Castel XQII focusing rail.*

Above  
*Yellow Loosestrife *Lysimachia punctata*. Photographed at 2:1 using the Castel XQII, BALPRO-1 bellows and the Nikon EL 50mm enlarger lens.*





Top left and above

*Common Spotted Orchid Dactylorhiza fuchsii. Image showing the positioning of the tripod with the BALPRO-1 and the 90mm flat field f/4.5 APO-DIGITAR macro lens from Schneider. You can clearly see the image on the LCD screen. This is an extremely sharp lens delivering 1:1 reproduction with both bellows units. Chromatic aberration and distortion is an absolute minimum with this lens.*

Left

*Hawthorn Blossom Crataegus monogyna BALPRO-1 90mm flat field f/4.5 APO-DIGITAR macro lens.*





## NOVOFLEX UNIVERSAL BELLOWS SERIES

As a Nikon shooter for nearly 25 years, I am using the Nikon Z7 II and the D850 for my bellows macro work. I use the BAL-F and BALPRO 1 on both systems. The BAL-F is ideal for the mirrorless cameras and were weight is a factor to consider.

### Novoflex Retro Reverse Adapter

The Retro Reverse Adapter is, in many ways, the heart of the Novoflex bellows system, providing automation to all of their units when using the appropriate camera and lens adapters. It was first introduced in 1999 for the Canon EOS system. Historically, reversing lenses was not an automated process and usually requires the stop-down metering technique. In the past, some camera manufacturers had a double cable release system for open aperture viewing on their bellows system, but you still had to set the aperture and shutter speed manually. The retro reverse adapter was, in many ways, new ground-breaking technology and maintained the communication between camera and lens via a connecting wire to both adapters.

The retro reverse adapter also allows lenses, especially zooms that are normally used for conventional photography to become improvised macros which when reversed are capable of producing magnifications greater than most macro lenses. Magnifications of 2X and greater are possible depending on the lens used with very acceptable results. Shorter fixed focal length lenses can also be used allowing greater magnifications. However, the downside with these lenses is the

reduced working distance between lens and subject, making lighting much more challenging. Currently, Novoflex has produced retro reversed adapters for many other camera brands.

The advantage of using the retro reverse adapter is twofold. First, it can be used with a lens on its own. Second, it can be used in any of the bellows systems, which adds automation and converts them into fully functioning auto bellows. Greater magnifications are possible while maintaining all of the camera/lens functions and the transfer of all metadata. The retro reverse adapter connects via the appropriate coupling adapter rings for your camera.



Top left

*The Novoflex Nikon retro reverse adapter for the Z series. The lens illustrated is the Z 24-70mm S. Reversing the lens allows it to function as a macro delivering excellent image quality and also higher magnifications than most conventional macros.*

Above

*Nikon Z7 II, Z retro reverse adapter, BAL-F bellows and Castel XQ II rail. The ideal setup for magnifications up to 2X in the field.*



## Novoflex Retro Reverse Adapters

The Retro Reverse adapters are available for the camera brands listed below.

Canon EOS EF-Mount:	EOS-RETRO
Canon EOS RF-Mount:	EOSR-RETRO
Fujifilm X-Mount:	FUX-RETRO
L-Mount:	LET-RETRO
MFT-Mount:	MFT-RETRO
Nikon Z-Mount:	NIKZ-RETRO
Sony E-Mount:	NEX-RETRO

## Universal BAL-F Bellows

The most compact of the two bellows systems is the BAL-F which can be used with virtually any combination of camera/lens system via the appropriate adapter rings. The BAL-F was launched back in September 2019 and is the most popular system among 35 mm photographers. It's highly versatile and has the capability to accept many different lenses and configuration setups. The bellows themselves are robust and finished in a way that does not attract dust or dirt between the compressed folds. They are blue on the outside in keeping with the traditional Novoflex branding colours. The maximum extension of the BAL-F when fully racked out is 116mm. the minimum extension when fully collapsed is 29mm. The aluminium framework is solid, well designed and most importantly stable when the camera assembly is attached to it. The finely-gearred focusing rail is smooth and a full rotation of the bellows knob advances the camera assembly 15mm. You can add a larger diameter fine focus knob which will give you greater control over focus advancement should you require it. The focus action is very precise and the level of resistance during movement is controlled by a smaller knob on the opposite side of the front bellows standard. With the camera assembly in place, there is no detectable play in any part of the equipment; an extremely important aspect when focus stacking and shooting high magnification imagery. The travel distance of the bellows is marked in millimetres. The 80mm rail in this case is more than adequate and allows for a wide range of magnifications.

The BAL-F is the ideal bellows unit for the 35mm format. If used in combination with a macro lens and reversing ring it's capable of



*The Novoflex BAL-F bellows unit with the Nikon Z retro reverse adapter in place. This unit is light, quick to use and easily carried in your bag when weight is an issue. Depending on the lens used, it can achieve magnifications around 4X. It can accommodate virtually all 35mm camera systems.*

### Technical specifications of the BAL-F

Size: height = 103mm (4.0') width: 130mm (5.1') rail length: 180mm (7.0')  
 Weight: 446g (0.9lbs') without adapters  
 Minimum extension: 29mm (1.1')  
 Maximum extension: 116mm (4.5')  
 Tripod connection: 1/4/3/8 and Arca UniQ/Compatible dovetail profile

magnifications well beyond 4X preserving all of the camera and lens automatic functions including metadata. Despite the bellows unit being light, it is extremely stable when connected to either the ClassicBall 3II or 5II; the advantage of these ballheads is the ability to use pre-set friction control to balance the weight of the camera assembly. Also, the Arca Swiss dovetail unlike some other universal makes fits precisely with the Novoflex Q = clamp ensuring there is no movement whatsoever.

Novoflex have developed a comprehensive adapter system which can accommodate all of the cameras listed (see camera compatibility list at the end of the review). The adapter rings for individual camera brands are not included in the price of the bellows and have to be ordered separately.





*The Nikon Z7 II, FTZ adapter, BAL-F bellows and the APO-DIGITAR 90mm flat field macro from Schneider. Being a manual lens, it requires the stop-down metering technique and setting the aperture and shutter speed individually. It can be used with the Z7 II or the D850 as in the example below. Either configuration works fine with the relevant adapters. I find it excellent for plant and fungi photography. It's extremely sharp with very low distortion and excellent colour contrast.*



Above and left

*Green-winged Orchid Anacamptis morio  
Combining the Castel XQ II with the bellows allowed me to position the setup quickly and set the magnification on the bellows and make the fine focus adjustments using the rail without having to move the whole camera assembly and tripod to achieve the focus point.*

*When used with the TrioPod PRO75 and the MagicBall, the setup is very stable with no movement. The close-up of the individual flower was photographed at virtually 1:1. Using the PRO75 system meant I could change the leg configuration to suit my needs since I was work flat to the ground for both these shots.  
Photographed using the D850.*





*The BALPRO-1 bellows with the Nikon Z retro reverse adapter. The BALPRO-1 has a greater internal diameter and a longer rail than the BAL-F. It is designed for medium format, but the 35mm format can also be used on this bellows unit as well, with full automatic function between camera and lens.*

### Novoflex BALPRO 1 Bellows

The BALPRO series is the professional version and the largest and most versatile of the universal bellows systems. There are two models The BALPRO 1 and BALPRO T/S. The latter incorporates (Tilt & Shift) allowing you to utilize the benefits of the Scheimpflug Principle permitting rotation of the lens about its vertical (called swing) or horizontal (called tilt) axis to adjust the plane of focus. Both systems when combined with the retro reverse adapter become automated preserving all of the camera and lens functionality.

The BALPRO 1 is primarily designed to accommodate medium format systems. However, having said that, 35mm formats work equally as well with this unit, but with the added advantage of accommodating larger camera bodies and longer focal length macros. It has a long, established reputation and was launched back in 2002. This is Novoflex's flagship system being robust enough to stand the rigours of professional use. It can accommodate virtually any camera lens combination with relative ease. Like the BAL-F the bellows is finished in the typical blue Novoflex branding colours. The maximum extension, when fully racked out, is greater than the BAL-F at 192mm



*The Nikon Z7 II and FTZ adapter with the BALPRO-1 and the Nikon EL 50mm f/2.8 enlarging lens. This combination requires setting the shutter speed and aperture manually. Live View is the ideal option when using the bellows with out the auto adapter. Magnifications of up to 5:1 are possible with this configuration.*

with a minimum extension of 40mm. The bellows framework is naturally solid, well designed and extremely stable with camera assembly in place. It is more than capable of producing very sharp, repeatable results for focus stacking at higher magnifications. It easily absorbs any shutter vibration, especially when working at slow shutter speeds. Focusing is smooth and precise with no play in any of the components. Both the BAL-F and BALPRO can be used without a focusing rail if needed although bellows are best used with one which makes the process of alinement and focusing much easier. However, unlike most other bellows units, the Novoflex BAL-F and BALPRO series have an elongated Arca Swiss plate that extends the length of the rail; this allows for easier placement and framing, which can be fine-tuned with the bellows extension knob. The bellows standards are well constructed and can facilitate the camera at either end to allow for reversed, shorter focal length lenses with a reduced lens to subject distance to be used. The adapter plates are retained in the bellows aperture by small securing screws which hold the lens and camera body rigid within the unit. Having an overall larger diameter and being slightly heavier, the BALPRO 1 produces a more balanced weight when longer focal length lenses are attached.





Above and top right

Silverweed *Potentilla anserina*

*The BALPRO-1 with 90mm APO-DIGITAR on the Nikon Z7 II supported on the PRO75 and MagicBall. I find myself using this combination more frequently now for some of my scientific images of plants. I like the overall colour balance and low distortion of the lens. The colour rendition and sharpness is excellent. It also means I can quickly resort to focus stacking when the XQ II rail is used for fine focus adjustments. Focus stacking, where the camera assembly moves rather than adjusting focus on the lens delivers a more accurate result in my opinion with less problems relating to artefacts etc.*

Right

*Campanula persicifolia*

*Using the BALPRO-1 and the Castel-Micro electronic focusing rail allowed me to produce a magnification of approximately 3:1 of these tiny emerging stamens. The process is quick once the bellows unit is in place. The long dovetail on the rail allows for quick positioning and fine adjustment with the bellows advance knob. Photographed using the Nikon Z7II, BALPRO-1 and the Nikon EL50mm enlarging lens.*







The bellows can also be used in manual mode if you don't have the appropriate retro reverse adapter. All you need is the correct fitting for your camera and the correct adapter ring for the lens you are using. Working through Live View you can employ the stop-down metering technique by setting the aperture and shutter speed manually. However, be aware that none of the camera's settings and metadata will be transferred to the digital image file.

### Technical specifications of the BALPRO-1

Size: height = 150mm (5.9') b = 115mm (4.52') rail length: 200mm (7.87')

Weight: 755g (1.6 lbs)

Minimum extension: 40mm (1.57')

Maximum extension: 192mm (7.55')

Tripod connection: 1/4 & 3/8 Arca UniQ/Compatible dovetail profile.



Left

Snow Fungus *Tremella fuciformis*

A fresh specimen of this fungus which was about half a centimetre in size. I used the BALPRO-1 bellows and the Nikon Z 105mm MC VR S macro to capture the image.

Above

For the image of the stamens of this passion flower I used the BALPRO-1 bellows in combination with the Castel-Micro which produces precise automatic advancement for each image. One important factor to bear in mind when using an electronic rail is you only have to touch the camera once.





## LENSES FOR BELLOWS

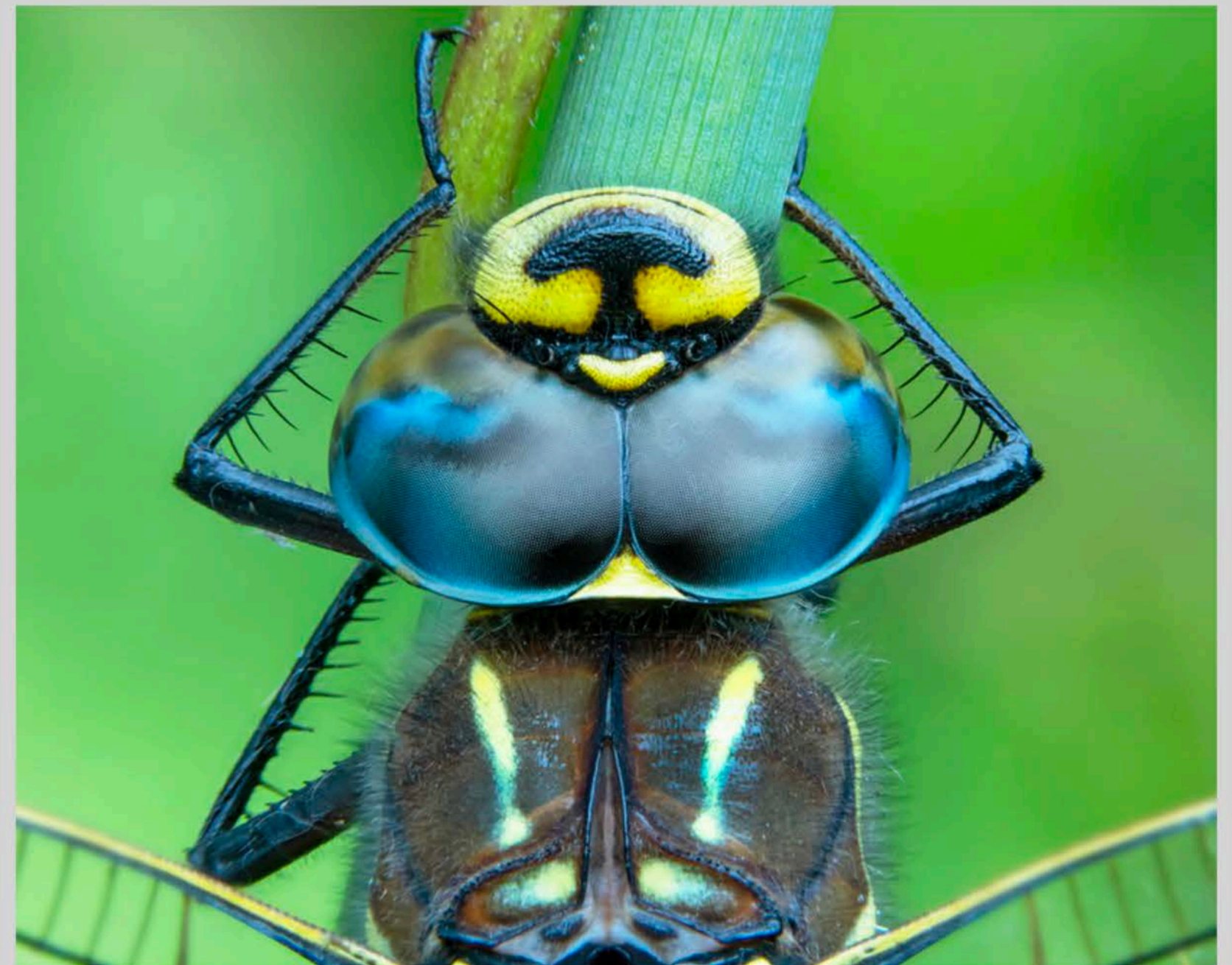
### Overview

Many different lenses can be used on bellows. The ones outlined below are those which I have tested with these bellows systems.

To begin with it's better to understand a few points about the optical differences between a macro and a regular lens. A macro lens will allow you to focus much closer to the subject than a conventional lens will. However, the optical characteristics are also different in how the lens is constructed. Two main points to consider are flat-field and curved-field lenses. Conventional lenses are mainly curved-field while the majority of macro lenses are flat-field. So what is the difference and how might this affect the image quality? If you were to photograph a two-dimensional subject for example, a drawing or a document which has a flat surface with a curved-field lens. The centre of the subject would be sharp but there would be a noticeable fall-off in sharpness towards the edges of the frame, especially at wider apertures. To overcome this you would stop the lens down, but diffraction could become an issue and it's still not going to be as sharp as the central area. Flat-field macro lenses have a flattened front elements and deliver edge-to-edge sharpness with virtually no distortion and vignetting. You could say that photographing three-dimensional subjects has little bearing on this since the subject occupies the centre of the frame and depth of field fall-off would render the edges of the frame out of focus

anyway. That is true to a point however, a lot depends on the subject you are photographing and how much of the frame it occupies.

During the last few months, I have been experimenting with different lenses. I have been very happy with the results from most of them although I have found that depending on the subject and the magnification you require some are better suited to the task than others. Nikon manufactured several macro lenses that were designed specifically for bellows only, most are capable of 1:1 and can be attached via the appropriate adapters. These are no longer made but can be bought through eBay and other second hand camera outlets. Magnifications over 5:1 are possible depending on the focal length of the lens used.



Top left

*The APO-DIGITAR from Schneider*

*This is the ideal combination with any of the bellows systems.*

Above

*Common Hawker Dragonfly Aeshna juncea*

*I photographed in close-up this resting dragonfly during early evening at virtually 1:1, using the BALPRO-1 and Castel XQ II rail.*





*The APO-DIGITAR 90mm f/4.5 on the BALPRO-1. Novoflex have a special adapter to accommodate this lens in any of the bellows systems.*

### Schneider APO-Digitar f/4.5 90mm Flat field Lens.

Novoflex offer this lens to go with the BAL-F and BALPRO systems. It is a superb lens with stepless adjustment from infinity right up to 1:1. Although designed for use with digital backs and medium format, this lens works extremely well with DSLRs, Mirrorless and APS-C formats due to the large image circle which remains constant throughout the aperture range. The reduced mount means it can be used with the appropriate adapters on a wide range of cameras systems. Being a manual lens, you do not have automation and have to set the desired aperture and appropriate shutter speed before making the exposure. However, using Live View I have not found this to be an inconvenience in any way. I'm well used to working with this technique from my days of shooting 120 roll film. I have been impressed with the quality and performance of this lens. The working distance is also very reasonable and it's apochromatic and digitally corrected. It is supplied with the appropriate Novoflex adapter ring to connect with either system. The lens is highly corrected flatness of field with minimum distortion.

### Nikon EL-Nikkor 50mm f/2.8

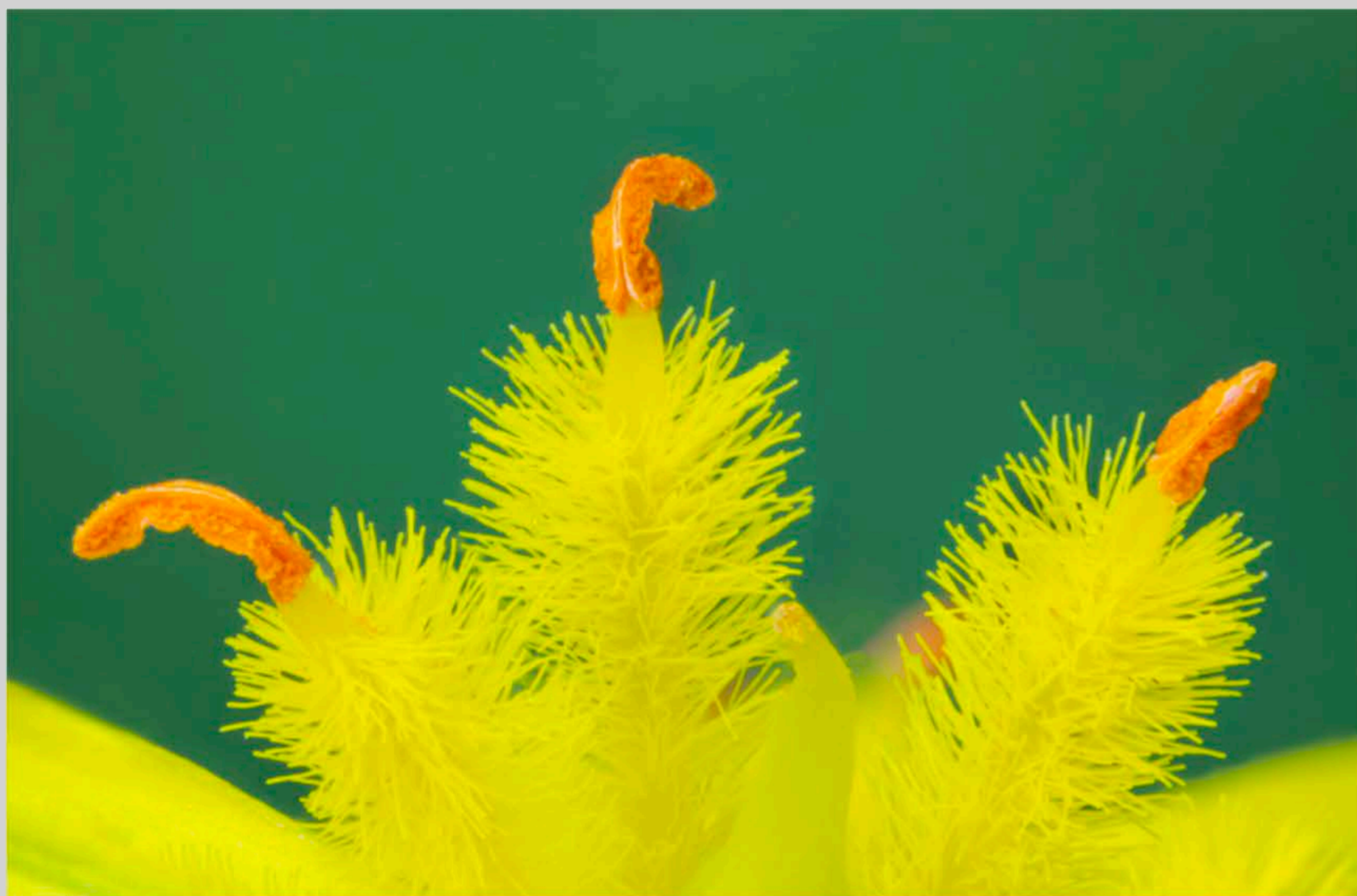
One of the ideal lenses for the Novoflex BALPRO 1 and BAL-F bellows systems is the Nikon EL 50mm f/2.8 enlarger lens. When you need to



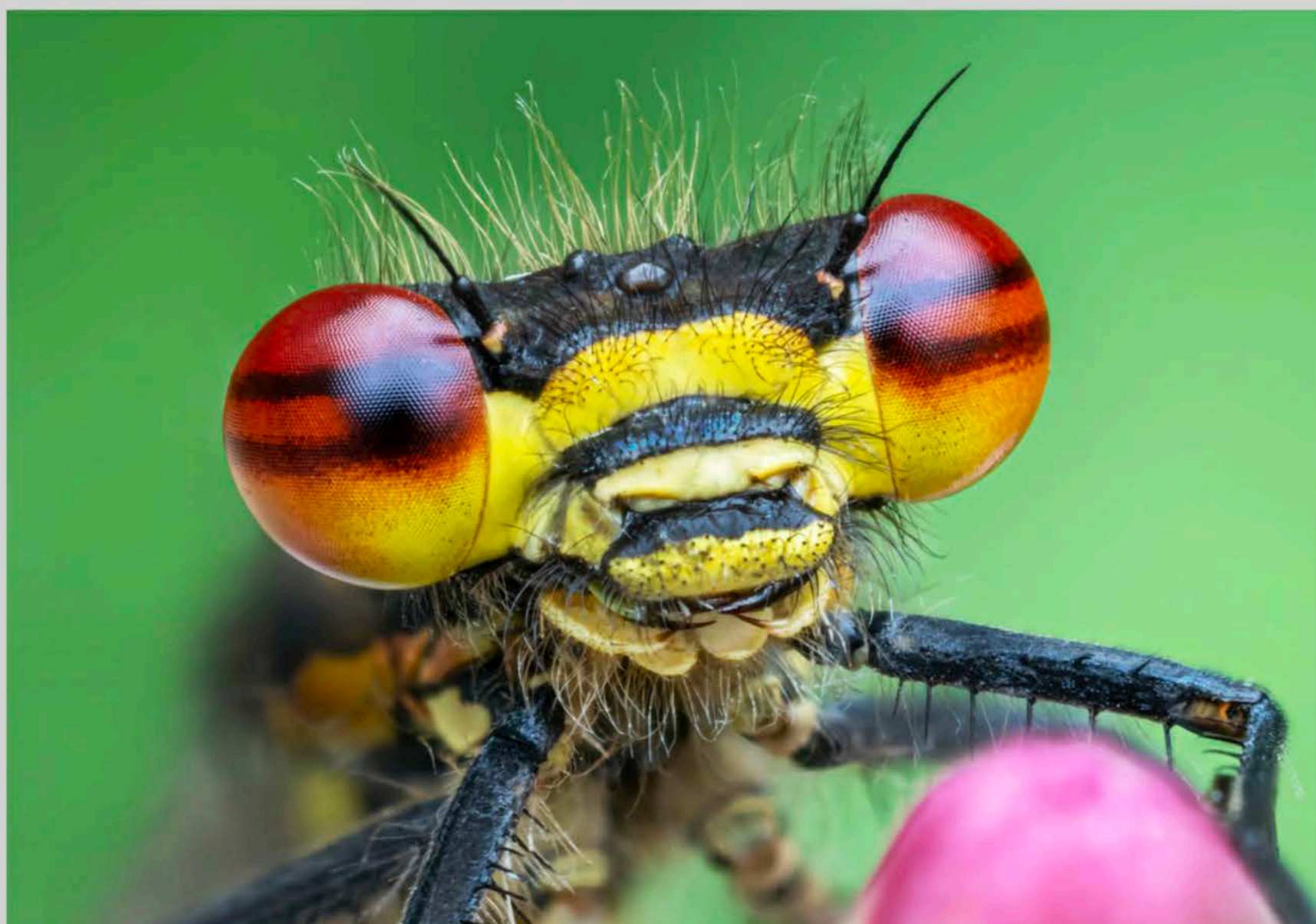
*The EL-Nikkor 50mm enlarging lens on the BALPRO-1. This lens can also be used on the smaller BAL-F bellows. Magnifications in the region of 4X can be achieved with either bellows setup,*

obtain magnifications above 1:1 enlarger lenses are an excellent choice. The EL 50mm f/2.8 is a six-element, four-group configuration. It has a 40.5mm filter thread on the front and a 39mm thread on the rear. The origins of this lens date back to the late 1950s when it was first released. The lens since then has undergone a number of incremental changes and was updated to the EL Nikkor 50mm f/2.8 N back in 1979. I do not have the newer version, but both will deliver really excellent results. The lens has an eight-blade aperture diaphragm and is corrected for chromatic aberrations beyond the visible spectrum and the ultraviolet wavelengths which various photographic papers were particularly sensitive to. If you plan to use this lens for magnifications below 1:1 then it's best to use it in its normal orientation. At 1:1 it is better to reverse the lens for improved optical performance. The working distance is approximately around 100mm which is quite reasonable and will leave enough room for lighting. I have found an aperture of f/8 is a good choice for magnifications below life-size and when reversed, between f/5.6 and f/8 gives a reasonably good result. Magnifications of around 4:1 are possible with this lens with acceptable results. However, above 4X working with a microscope objective lens would be a better alternative. Should you want to explore the possibility of using microscope objective lenses Novoflex does have the necessary adapters to attach these lenses to the bellows.

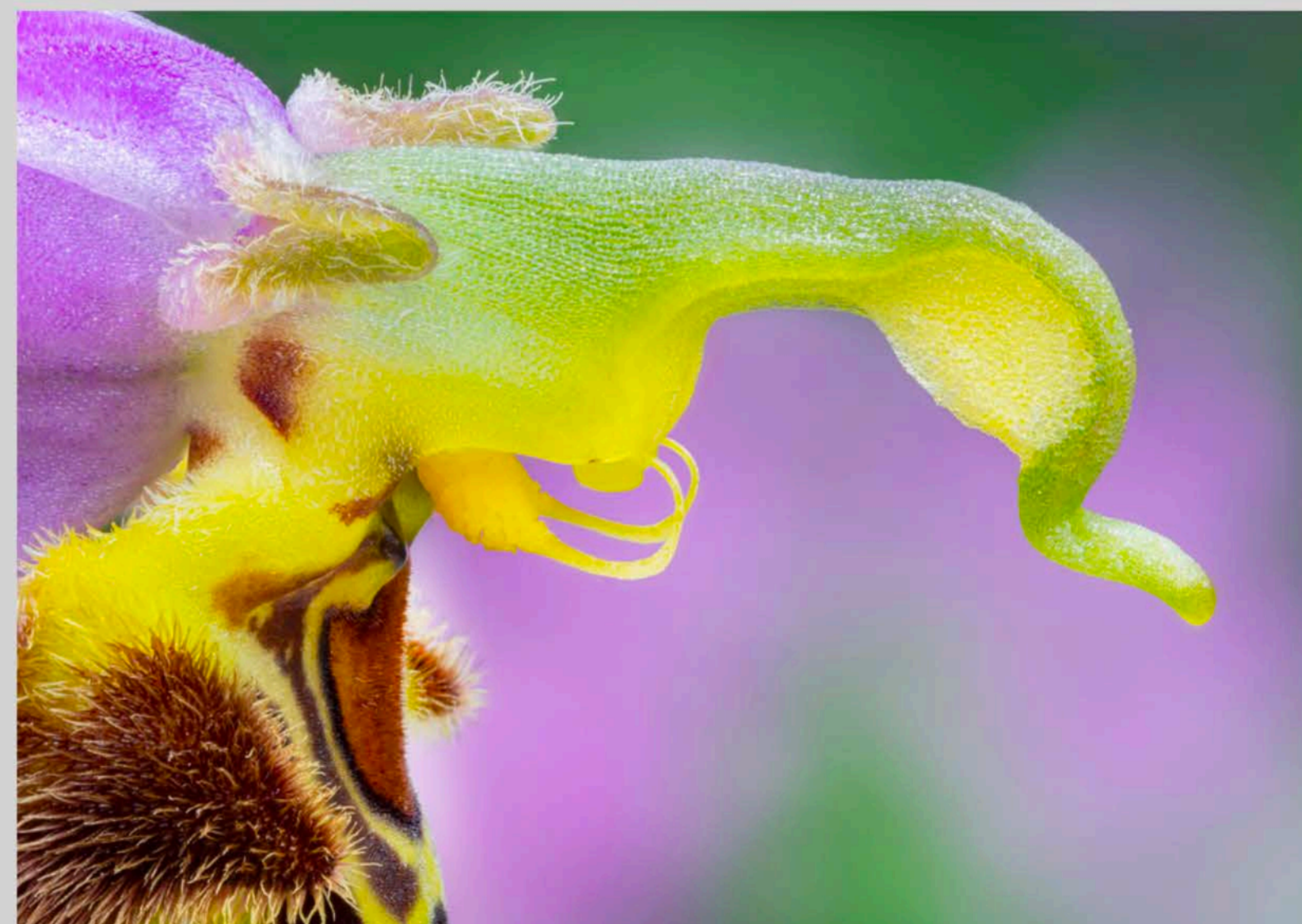




Above  
Bog Asphodel *Narthecium ossifragum*  
*It would not be possible to achieve adequate depth of field across these small stamens which are approximately 1mm in size. The image was focus stacked using the BALPRO-1 and the Nikon Z MC 105mm VR S macro lens.*



Below  
Bee Orchid *Ophrys apifera*  
*A close-up photo of the tiny pollina of this orchid which are beginning to drop down from the column. The pollina are about 1.5mm in diameter. The camera setup in the field is illustrated on page 5. The images focus stacked comprising 30 images to produce the final photo. The composite image was produced using Helicon Focus.*  
*Stability is absolutely critical when focus stacking to ensure continuity in the final image. A stem stabiliser of my own design was used for additional support without damaging the flower.*



Left  
Large Red Damselfly *Pyrrhosoma nymphula*  
*An extreme close up of the eyes of this resting female. I had several attempts at focus stacking this insect, but during the stack it would move its head or legs, which meant I had to start the process again. It was very early in the morning with virtually no wind which is a good time to attempt this when insects are still cold from the overnight temperatures. This type of shot would have been almost impossible to achieve during the middle of the day when they are active. Working early in the morning, or late evening when insects settle for the night gives you the best chance of success. However, having said that be prepared for failures. High magnification images of these insects is always challenging. Photographed on the Nikon Z7 II, the BAL-F bellows, and the Nikon EL 50mm enlarging lens.*





*The Nikon Z 24-70mm S reversed on the BALPRO-1 using the Z retro reverse adapter. All of the auto functions between camera and lens, including metadata are preserved. This lens, when reversed, doubles as a macro allowing magnifications above 3X with excellent results. If the lens is extended to its longest focal length it gives greater working distance but a reduced magnification factor.*

## Other lenses

### Nikon 24-70mm f/4 S

I found the Z 24-70mm f/4 S, which is the kit lens when reversed on the adapter to be an ideal, producing some excellent results. It's also a good introduction to macro as many photographers will already own a lens in this focal range. It's best to keep the lens extended to its longest focal length to improve the lens to subject distance. All of the automatic functions are maintained when the retro reverse adapter is used.

### Nikon Z MC 105mm f/2.8 VR S macro

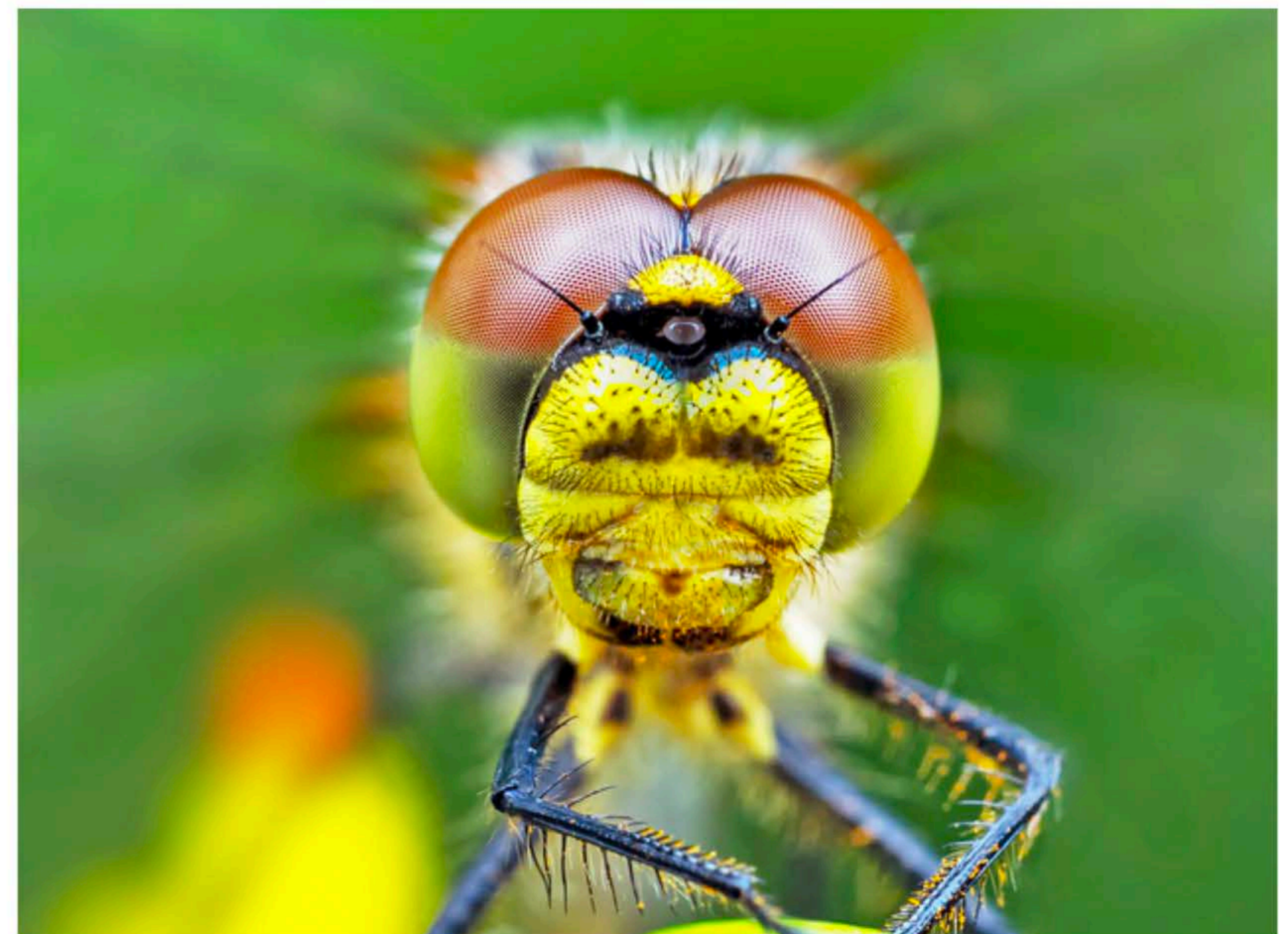
I have also been testing the new Nikon Z 105mm f/2.8 macro on the BALPRO 1 with excellent results. With this combination, you can easily achieve magnifications around 4X with the lens set at 1:1. If you are intending to purchase the latest Nikon Z 105mm macro then investing in one of the Novoflex bellows systems means you have the capability to enter the world of true macro photography without the need to purchase any other additional lenses.



*The Nikon Z MC 105mm f/2.8 VR S with the BALPRO-1 bellows. This is one of my preferred combinations for magnifications up to 2X with a focusing rail when used in the field.*

Below

*Black Darter Dragonfly *Sympetrum danae*. Photographed with the The Nikon Z MC 105mm f/2.8 VR S and the BALPRO-1 bellows. Magnification around 1.3X.*







*White-Rock-Rose Cistus-salviifolius*  
*Photographed at 1.3X with the Nikon Z7 II and Z 24-70mm f/4*  
*reversed on the BALPRO-1 using the Z retro reverse adapter. I had*  
*the lens zoomed to its longest focal length, which gives the best lens*  
*to subject distance.*

**Musk Mallow *Malva moschata***

*Recently I have been experimenting several different lenses. When*  
*using the Nikon D850, I would frequently use the 105mm f/2.8 G*  
*micro nikkor along with the 2X AF-S TC-20E III converter, which*  
*produced acceptable results. However, switching the the*  
*BALPRO-1 bellows with the Z MC f/2.8 105mm macro f/2.8 VR S*  
*produces much sharper results with excellent detail. Also,*  
*chromatic aberrations are greatly reduced with this lens. I much*  
*prefer this configuration now for all of my macro focus stacking up*  
*to 2X.*







*The Laowa 2.5-5X macro on the BALPRO-1 bellows.  
Putting a 5X macro on the bellows greatly increases your magnification options.  
You need to set the aperture and shutter speed separately.*

### Bellows- Nikkor-P 105mm f/4

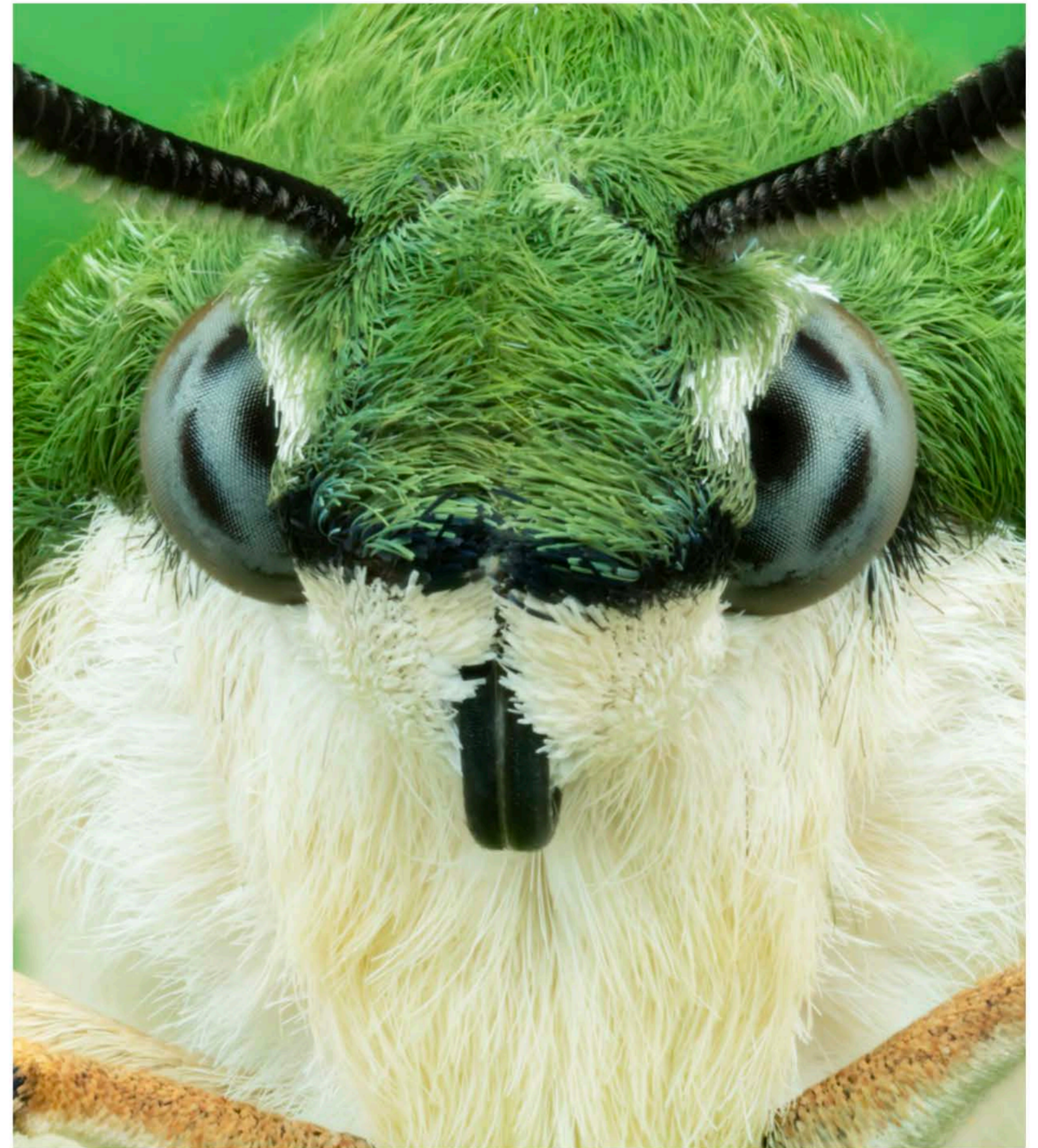
Pre-digital there were a number of lenses designed for bellows work. The Nikkor P 105mm is a bellows only lens and contains no focusing mechanism. It was a popular choice back in the early 1970s and used on the PB-6. Many of the older manual lenses are long out of production but can be acquired on eBay and specialist second-hand photography outlets.

Short telephotos can also be used and when placed on bellows focus closer than their minimum focusing distance. Longer focal length lenses increase working distance but produce less overall maximum magnification. Wide-angle lenses when reversed produce the largest magnifications, but the lens to subject distance is reduced.

### Laowa 25mm f/2.8 5X & Canon MP-E 65mm f/2.8 5X

Ultra-macros such as the Laowa 25mm f/2.8 2.5-5X and the Canon MP-E 65mm f/2.8 1-5X macros can be used on either of the bellows systems. These lenses are capable of producing high reproduction ratios well beyond 5:1 and require a focusing rail for best results. Being manual lenses you have to set both the aperture and shutter speed manually and use Live View when setting up.

Currently, Novoflex has a retro reverse adapter for the Nikon Z series, which they added in 2019. Nikon DSLR shooters can only use the bellows systems with manual lenses. However, you can still get excellent results working manually and using live view on the D850, which isn't a major inconvenience.



Saunders' Bee Hawk-moth *Hemaris saundersii*

*I wanted to focus on the eyes and proboscis of this small day-flying moth. Many moths when at rest will remain relatively still providing that they, or the surrounding vegetation is not disturbed. I used the Nikon D850, BALPRO-1 and the Nikon EL 50mm enlarger lens for the shot. The camera was mounted on the Castel-Micro electronic rail which can perform the stack sequence much quicker than doing it manually.*



## NOVOFLEX BELLOWS & CASTEL-MICRO ELECTRONIC STEPPING RAIL

Working at magnifications beyond 1:1 raises its own challenges in the field. With bellows and a focusing rail, it's possible to achieve magnifications around 2X. Beyond this, it becomes considerably more challenging when advancing the camera assembly by hand. There are so many other factors to consider for example, wind, movement of the subject etc. and the advancement needs to be very precise, something that is difficult to achieve when rotating it manually yourself. Using an electronic focusing rail such as the Castel-Micro performs this task automatically for you.

One of the real advantages of combining the bellows with an electronic rail 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 wander off looking around for other subjects while it does its business.

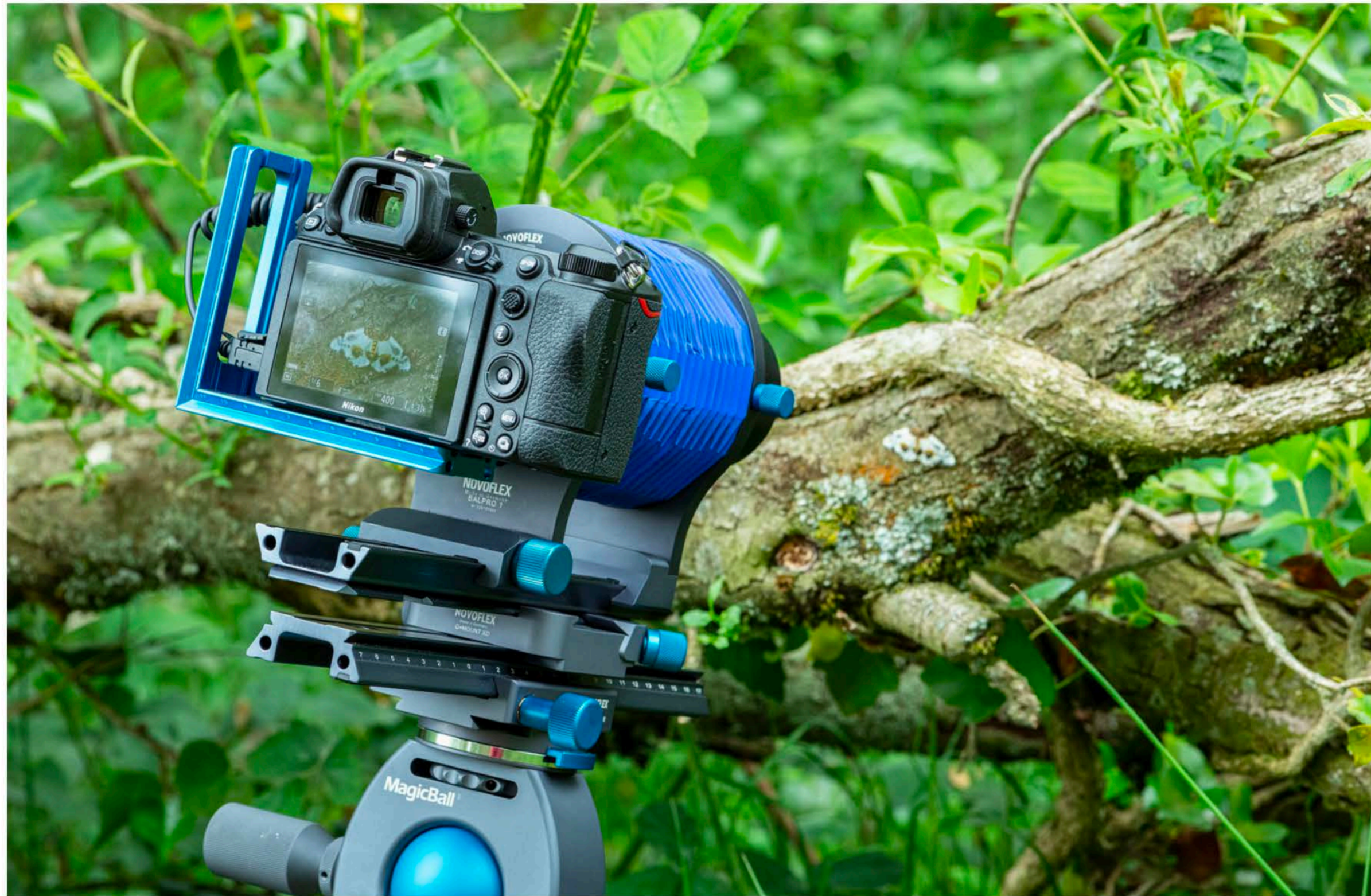
Photographing at life-size and above is where the Castel-Micro excels. Used in combination with bellows and a macro lens is where you begin to see results that are far more challenging to achieve using a manual setup. Another advantage of using the electronic rail is it can complete the process of focus stacking much quicker than you can do manually. For example, if you are creating a 50 image stack that is fifty times you have to touch your camera assembly. The time taken to complete the task is considerably longer than using an electronic rail. Novoflex designed the Castel-Micro to integrate perfectly with all of its bellows systems and is the ideal combination when you need to achieve greater magnifications. Using Live-View makes the whole process easier. If you plan on doing a lot of high magnification macro then this is the perfect setup.

*The fully automated BAL-F bellows with the Nikon Z 24-70mm reversed, the Z retro reverse adapter linked up the the Novoflex Castel-Micro electronic focusing rail. Working at higher magnifications requires greater attention to focus advancement. If you want to achieve precision in your stacks at a specified step this is by far the best way to achieve it.*



*The Tripod PRO75 and the ClassicBall 5 II is an solid foundation to ensure complete stability throughout the stacking process.*





*Nikon Z 7 II, APO-DIGITAR 90mm f/4.5 and the BALPRO-1 bellows. I found this resting moth on a fallen branch. Fine focus adjustment was made with the Castel XQ II. The MagicBall is ideal ball head in these situations as it allows 120 ° movement in virtually any direction and is more than capable of handling the weight of the entire camera assembly.*

## WORKING WITH NOVOFLEX BELLOWS IN THE FIELD

It's fair to say that using bellows for the first time in the field can be a little awkward especially if you're not someone who shoots close-ups regularly. It takes a little time to become familiar with setting and positioning the unit in place. However, within a short time you will find it no different than working with a macro lens. Working with bellows is a bit like shooting medium format it requires a methodical disciplined approach and not the machine-gun style of 35mm where you have lots of images of the same thing. Those photographers who used medium format historically will understand what I'm saying here. I recommend working with a focusing rail such as the XQ II

which allows you to fine-tune your starting position without trying to manoeuvre the unit on a tripod into position.

Initially, it's best to concentrate on subjects that are easy to find and not too complex. I recommend working at lower magnifications initially to become familiar with using the equipment. It is also important to select your days carefully, those with little to no wind and overcast light are the ideal conditions for photography. Since most of the subjects you are intending to photograph will require focus stacking it will be easier to achieve continuity in your exposures in these conditions. Changing light and intermittent wind makes it much more challenging to get an acceptable results. If you have to work under these conditions look for shaded areas where the light is more uniform.





Clouded Magpie Moth *Abraxas sylvata*

*The finished image from the setup on previous page. The advantage of this setup is having the ability to adjust the position of the camera assembly with the focusing rail without having to move the tripod and risk disturbing the surrounding vegetation and branch spooking the moth.*

### Subject selection

Photographing mobile subjects such as insects is much more challenging whether using bellows or even a conventional macro lens. Having knowledge of their behaviour and habits is essential in my opinion, but be prepared for failures. All insects are cold-blooded and therefore the ambient temperature is an important factor to consider. Not all insects are amenable to bellows photography especially when employing higher magnifications. However, having said that it is possible to get some excellent results with some species especially if shooting early in the morning when temperatures are low, or in the evening when many settle for the night. The weather and especially wind are also major dictating factors, but when conditions are favourable you can achieve some decent results. You don't have to limit your photography to insects there are many subjects to explore where bellows photography can open up a world beyond your normal vision. The intimate structures of plants, lichens, fungi, bryophytes and the seashore create endless possibilities.



Common Spotted Orchid *Dactylorhiza fuchsii*

*Photographed with the Nikon Z7 II, BALPRO-1 bellows and the Z MC 105mm VR S. Camera assembly supported on the Novoflex PRO75 and MagicBall head.*





*The small forewing eyespot of moth *Nudaurelia macrothyris*  
The Nikon Z7 II and BALPRO-1 bellows with the Z MC 105mm VR S macro. The moth was in its normal resting position. I was careful not to disturb it. The camera was mounted on the Castel-Micro electronic focusing rail. The approximate reproduction ratio is 2.5X.*

## A FINAL WORD

I've been using the Novoflex bellows systems for a while now. I have to admit it has rekindled my interest from the days of film. The digital revolution has, in many ways, made the process of using bellows more straightforward than in the past. I carry them frequently into the field in my bag and where opportunities present themselves I find more often now I reach for the bellows rather than an ultra-macro. Being

able to explore subjects and their intricate structures is, in many ways, refreshing from the routine imagery I often have to do.

For those who don't own a dedicated macro lens, using bellows is a great way of exploring the smaller world utilising the lenses you already own. Specialised software programs for focus stacking such as Helicon Focus make the whole process straightforward and the results from even an average lens are excellent!



# NOVOFLEX BELLOWS ADAPTER SYSTEM



*The Nikon Z7 II with the BALPRO-1 and the Z 24-70mm f/4 reversed using the Nikon Z Retro Reverse Adapter.*

## ADAPTER SYSTEM

Thanks to a complete adapter ring system (see tables on following pages), almost any combination of different camera and lens systems in the 35mm range and below is possible. Even special lenses can be adapted. Attach the appropriate adapters first to the lens or the camera (screw thread or bayonet lock). Now place the adapter rings in the openings of the bellows unit and lock them with the two locking screws on the front standard and with the two locking screws on the rear standard.

## MOUNTING

The bellows unit is equipped with a dovetail guide for direct mounting on a NOVOFLEX quick-release of the Q=System (ARCA / UNIQ/C compatible). The safety pin of a NOVO-FLEX quick-release engages into the milling cut-out and prevents unintentional slipping out of the rack if the corresponding clamping screw was accidentally not fully tightened. Alternatively, the 1/4 "or 3/8" threaded holes or can be used for

mounting on a focusing rack or tripod head. The installation of a video pin serves as anti-twist protection.

## OPERATION

For close-up and macro shots, the image section (magnification) is determined only by the length of the bellows extension. The length can be changed with the drive knob. To loosen or clamp the front standard, use the locking knob. Focusing is done by changing the lens-to-object distance. With free hand shots one achieves this by changing the posture. When shooting from a tripod or on a copy stand this is done with the help of a focusing rack. Recommended focusing racks can be found on the Novoflex website [www.Novoflex.de](http://www.Novoflex.de)

## PRACTICAL TIPS

If you use the BAL-F as an automatic bellows unit, it is best to turn off the autofocus of your camera or lens as it will



## NOVOFLEX BALPRO-1 ADAPTER SYSTEM

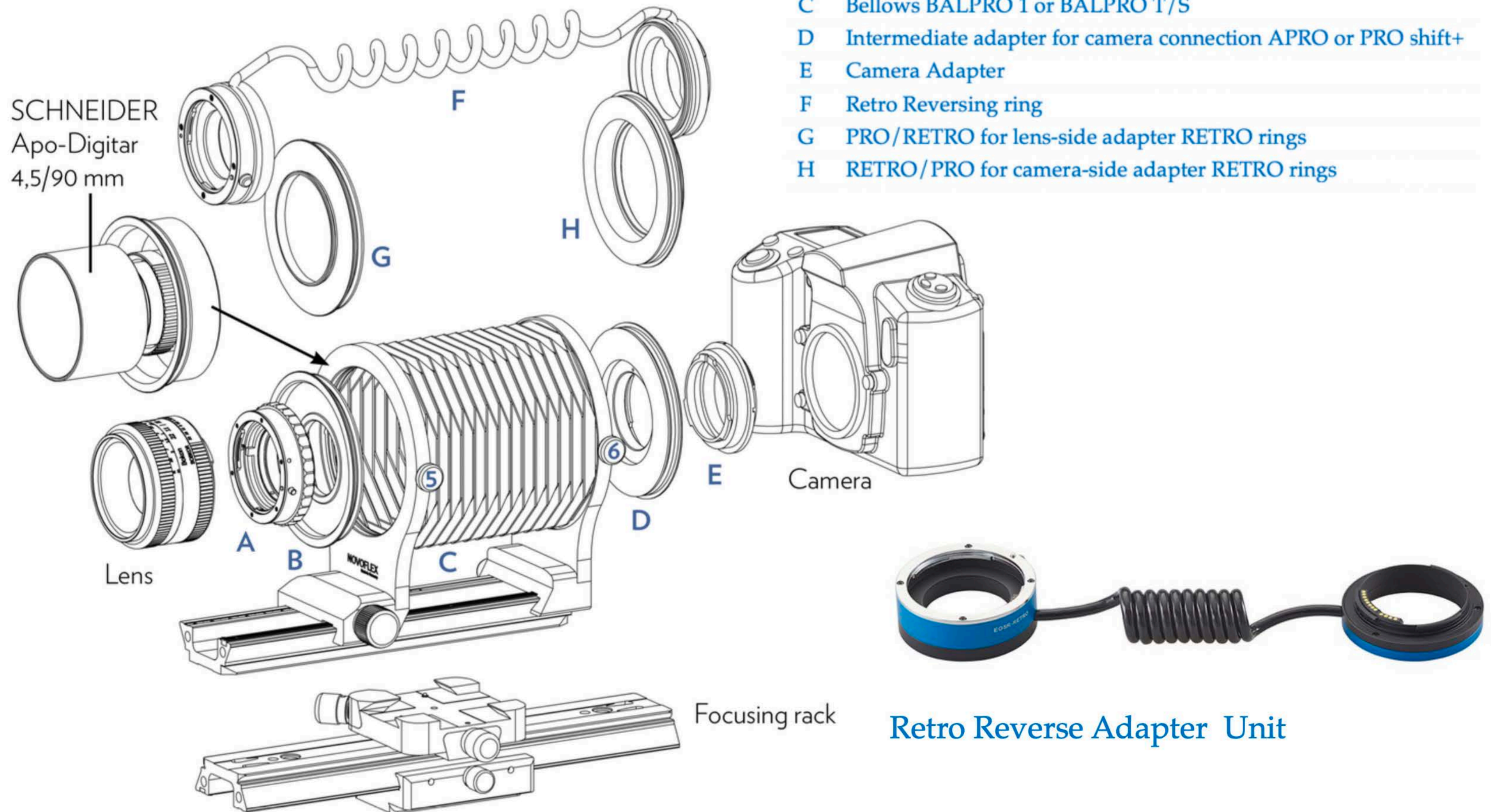
The diagram below illustrates the Novoflex BALPRO-1 Adapter System.

Attach the matching adapter to the lens or camera (screw thread or bayonet lock). Insert the appropriate adapter rings into the bellows aperture and secure them with the locking knobs, (5) on the front

standard and (6) on the rear standard securing the camera assembly in place.

For further information on adapter selection for your camera brand refer to the Novoflex website or contact Novoflex direct.

- A Lens Adapter
- B Intermediate adapter for lens connection PROLEI
- C Bellows BALPRO 1 or BALPRO T/S
- D Intermediate adapter for camera connection APRO or PRO shift+
- E Camera Adapter
- F Retro Reversing ring
- G PRO/RETRO for lens-side adapter RETRO rings
- H RETRO/PRO for camera-side adapter RETRO rings





## NOVOFLEX BALPRO-1 ADAPTER SYSTEM

### Camera Adapter Rings

CAMERA MOUNT	ADAPTER
Canon EOS EF-Mount*:	CANA-AF and APRO or PROshift+
Canon EOS M:	EOSMA and APRO or PROshift+
Canon EOS RF-Mount*:	EOSRA-K and APRO or PROshift+
C-Mount:	CEA-K and APRO or PROshift+
Fujifilm G-Mount****:	FUGPRO
Fujifilm X-Mount*:	FUXA-K and APRO or PROshift+
Hasselblad V-SYSTEM:	HAPRO
Hasselblad X-SYSTEM:	HAXPRO
Leica M (Live View):	LEMA-K and APRO or PROshift+
Leica S:	LESPRO
L-Mount (Leica, Panasonic, Sigma)*:	LETA-K and APRO or PROshift+
Mamiya 645:	MAMPRO
MFT-Mount*:	MFTA and APRO or PROshift+
Nikon F:	NIKA and APRO or PROshift+
Nikon Z-Mount*:	NIKZA-K and APRO or PROshift+
Pentax K/SIGMA:	PENTA and APRO or PROshift+
Pentax 645:	TAXPRO
Pentax 67:	PENTPRO
Phaseone IQ3 and IQ4 Digital Backs:	PHASEIQPRO
Sony Alpha/Minolta AF:	MINA-AF and APRO or PROshift+
Sony E-Mount*:	NEXA-K and APRO or PROshift+

### Lens Adapter Rings

CAMERA MOUNT	ADAPTER
Canon EOS EF-Mount*:	* (see below) or PROLEI and LEIEOS***
Canon EOS RF-Mount*:	* (see below)
Canon FD:	PROLEI and LEICAN
C-Mount:	PROLEI and LEICE
COPAL-0 Plan:	PROCOPAL-0F
COPAL-0 Versenkt:	PROCOPAL-0
Fujifilm X-Mount*:	* (see below)
Hasselblad V:	PROHA
Leica M:	PROLEI and LEI-M
Leica M39:	PROLEI
Leica R:	PROLEI and LEI-F
L-Mount (Leica, Panasonic, Sigma)*	* (see below)
M42x1:	PROLEI and LEICO
Mamiya 645:	PROMAM
MicroFourThirds:	* (see below)
Microscope lens having RMS thread	PROLEI and LEIMIK
Minolta MD/MC:	PROLEI and LEIMIN
Nikon G**:	PROLEI and LEINIK NT
Nikon Z-Mount*:	* (see below)
Olympus OM:	PROLEI and LEIOM
Pentax K:	PROLEI and LEIPENT
Sony Alpha / Minolta AF**:	PROLEI and LEIMIN-AF NT
Sony E-Mount:	* (see below)
V-Groove Ø46:	PROV46
BALUNI- and CASTBAL T/S Rings:	UNIPRO
Shift-Adapter:	PROshift+

### Legend

- \*\* Lenses can be stopped down steplessly with this adapter.
- \*\*\* Designed for EF-Mount lenses that feature a manual aperture ring
- \*\*\*\* Due to the shape of the housing, the Fujifilm GFX 100S requires a PRO25 extension tube

Adapter combinations to convert BALPRO bellows into a full-automatic bellows unit.

Canon EOS EF-Mount:	EOS-RETRO
Canon EOS RF-Mount:	EOSR-RETRO
Fujifilm X-Mount:	FUX-RETRO
L-Mount:	LET-RETRO
MFT-Mount:	MFT-RETRO
Nikon Z-Mount:	NIKZ-RETRO
Sony E-Mount:	NEX-RETRO



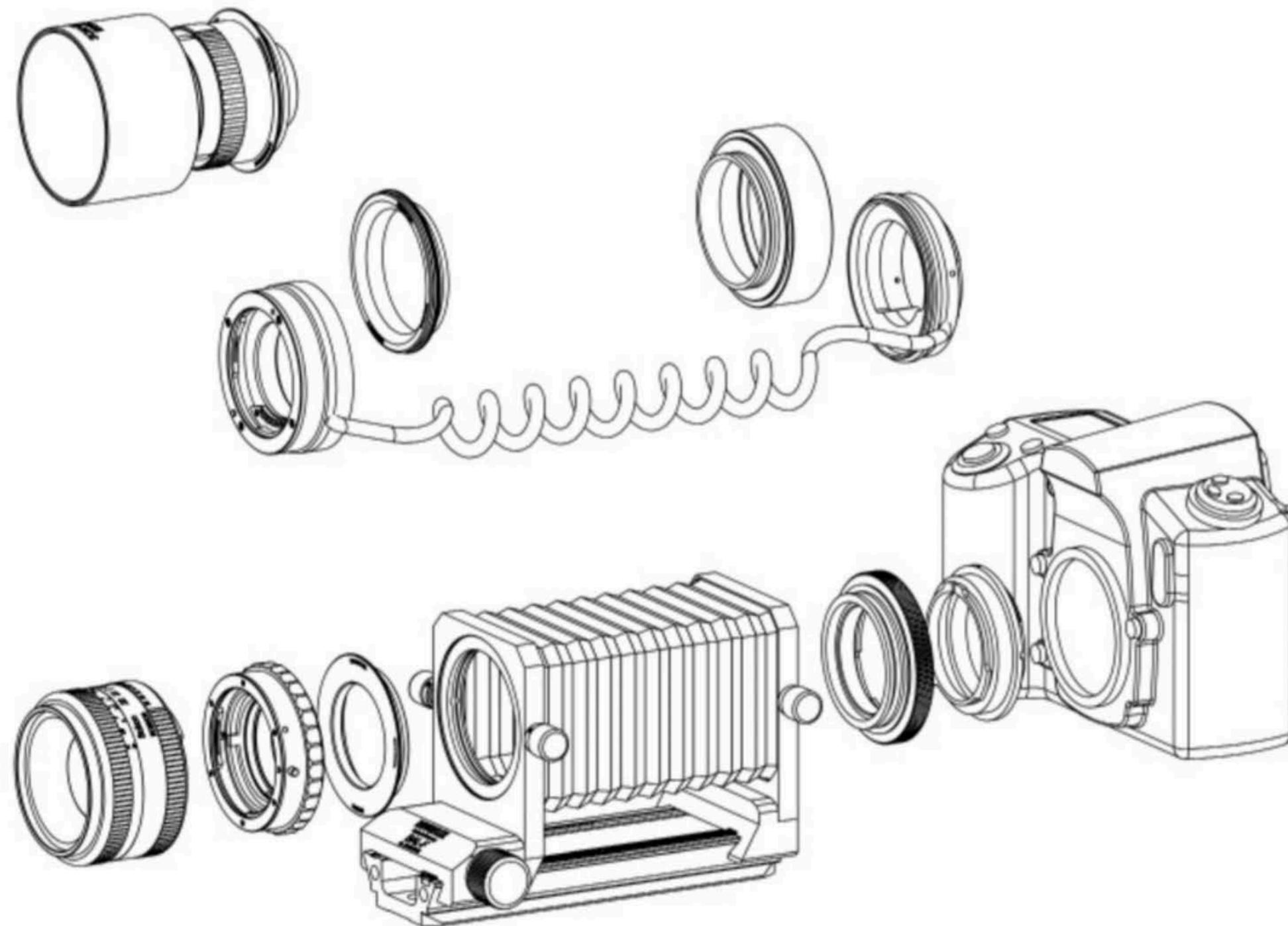


## NOVOFLEX BAL-F ADAPTER SYSTEM

The BAL-F is Novoflex's most popular bellows system and will accommodate most 35mm camera systems.

Listed below are the the Retro Reverse Adapter units for the following camera brands.

Canon EOS	EOS-RETRO / FLEX FLEX / RETRO
Canon EOS-R	EOSR-RETRO RETRO / FLEX FLEX / RETRO
Fujifilm X	FUX-RETRO RETRO / FLEX FLEX / RETRO
L-Mount:	LET-RETRO RETRO / FLEX FLEX / RETRO
MFT	MFT-RETRO RETRO / FLEX FLEX / RETRO
Nikon Z	NIKZ-RETRO RETRO / FLEX FLEX / RETRO
Sony E	NEX-RETRO RETRO / FLEX FLEX / RETRO



### Retro Reverse Adapter Unit



*Photographing lichens using the BAL-F with the Castel XQ II focusing rail, the Schneider APO-Digital lens on the Nikon D850.*



## NOVOFLEX BAL-F ADAPTER SYSTEM

### Camera Adapter Rings



### Lens Adapter Rings



CAMERA MOUNT	ADAPTER
Canon EOS*	CANA-AF and AFLEX
Canon EOS M:	EOSM/A and AFLEX
Canon EOS R*	EOSRA and AFLEX
Fujifilm X*	FUXA-K and AFLEX
Fujifilm X-Mount*:	FUXA-K and APRO or PROshift+
Leica M (Live View):	LEMA-K and AFLEX
L-Mount*:	LETA and AFLEX
MicroFourThirds*:	MFTA and AFLEX
Nikon 1:	NIK1A and AFLEX
Nikon F:	NIKA and AFLEX
Nikon Z*:	NIKZA and AFLEX
Pentax K/SIGMA:	PENTA and AFLEX
Pentax Q:	PENTQA and AFLEX
Samsung NX:	NXA and AFLEX
Sony Alpha/Minolta AF:	MINA-AF and AFLEX
Sony NEX/E-Mount*:	NEXA and AFLEX

LENS	ADAPTER
Canon EOS*:	* (see below)
Canon EOS R*:	* (see below)
Canon FD:	FLEXLEI and LEICAN
Contax/ Yashica:	FLEXLEI and LEICONT
COPAL-0:	FLEXCOPAL-0
Fujifilm X*:	* (see below)
Leica M39	FLEXLEI
Leica M:	FLEXLEI and LEI-M
L-Mount*:	* (see below)
M42x1:	FLEXLEI and LEICO
Microscope lens having RMS thread	FLEXLEI and LEIMIK
Minolta MD/MC:	FLEXLEI and LEIMIN
Nikon G**:	FLEXLEI and LEIINK NT
Nikon Z*:	* (see below)
Olympus OM:	FLEXLEI and LEIOM
Pentax K:	FLEXLEI and LEIPENT
Sony Alpha/ Minolta AF**:	FLEXLEI and LEIMIN-AF NT
Sony E-Mount*:	* (see below)



# *Further Information*

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Eri Silkmoth *Samia-ricini* forewing scales

## *Acknowledgement*

*I would like to express my grateful thanks to Martin Grahl General Sales Manager for Novoflex Germany for his assistance and organising the various samples.*

Further information on the Novoflex bellows and adapter systems can be obtained through the following distributors.

**N**  
**NOVOFLEX** NOVOFLEX Präzisionstechnik Grr  
Brahmsstr. 7  
D-87700 Memmingen  
Germany  
  
Tel.: +49 8331 88888  
Fax: +49 8331 47174  
Email: [mail@novoflex.de](mailto:mail@novoflex.de)

**United Kingdom**  
Speed Graphic Mail Order Ltd  
Unit 9A Oakhanger  
Farm Business Park  
Oakhanger  
Bordon GU35 9JA  
Tel: +44 1420 560 066  
email: [sales@speedgraphic.co.uk](mailto:sales@speedgraphic.co.uk)  
[www.speedgraphic.co.uk](http://www.speedgraphic.co.uk)

**USA**  
MAC Group  
75 Virginia Road  
North White Plains  
NY 10603  
Tel: +1 914 347 3300  
Fax: +1 914 347 3309  
email: [info@macgroupus.com](mailto:info@macgroupus.com)  
[www.macgroupus.com](http://www.macgroupus.com)

**Canada**  
Red Raven Marketing  
74 Marietta St.  
Uxbridge, Ontario  
L9P 1J5  
Tel: +1 905 852 4106  
Fax: +1 905 852 4106  
eMail: [info@redravenphoto.com](mailto:info@redravenphoto.com)  
[www.redravenphoto.com](http://www.redravenphoto.com)





*Campanula persicifolia*  
Photographed with the Nikon D850, BALPRO-1 and Nikon EL 50mm Enlarger lens.  
Magnification 2.5X.

*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 specialist natural history publications. He has had several solo exhibitions of his work. He also runs workshops in Ireland and Europe and has a special interest in insects and the declining wild orchid populations in his own country and further afield.*





[www.novoflex.de](http://www.novoflex.de)