

Macro Photography

Introduction

Wikipedia describes macro photography as:

“extreme close-up photography, usually of very small subjects, in which the size of the subject in the photograph is greater than life size (though *macrophotography* technically refers to the art of making very large photographs). By some definitions, a macro photograph is one in which the size of the subject on the negative or image sensor is life size or greater. However in other uses it refers to a finished photograph of a subject at greater than life size.”

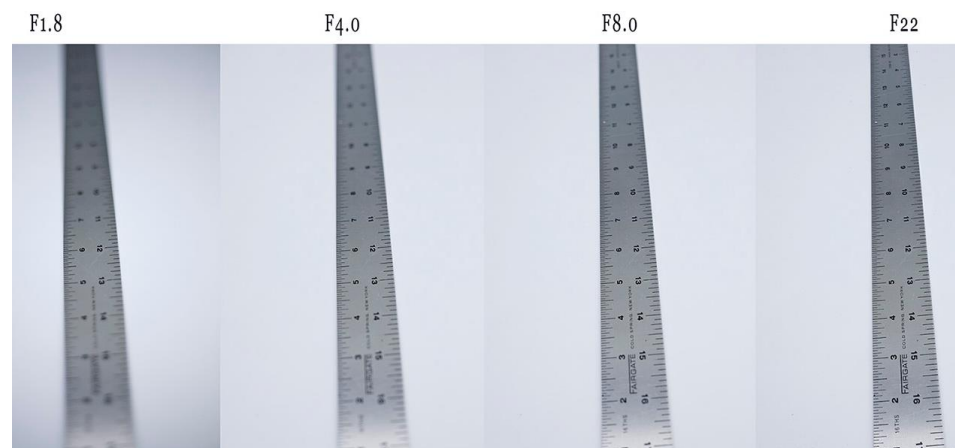
NB: when macro photography is used to describe the size of the subject on the sensor it is usually referring to full frame sensors.

Macro photography can be used in many ways. For example, it's often used in medicine to get close ups of body parts. Another use for it is that a wedding photographer might use a macro lens to capture details such as the rings, flowers, place settings etc. It can also be used for abstract images turning the ordinary into strange and wondrous objects.

In order to take macro images the right equipment is needed. Apart from the obvious (a camera – preferably a DSLR), other equipment is also needed, some are essential and others preferable. These are:

- One item which is not completely necessary but strongly recommended is a sturdy tripod. The best are those that can be set up very close to the ground for shots such as small flowers in their natural habitat.
- Remote or cable trigger for the camera. Again, not necessary but strongly recommended when working with a tripod as pressing the shutter release can cause vibrations which may blur the image.
- Macro lens or adaptor (these are described in more detail below).
- Lighting. This can be by natural or artificial light. Types of artificial light are described later.

Depth of field is an important consideration when taking macro images. Because of the extremely short camera to subject distance a small aperture and so, possibly, a slow shutter speed will be needed as depth of field will be extremely shallow, with a DoF of just a few millimetres not being unusual. This is why a tripod and shutter release is recommended. The image below demonstrates how DoF changes at different apertures:



As can be seen from the above image, as the aperture increases more of the rule is in focus.

It is crucial that the camera is set up in the right way when taking macro shots. As already mentioned, because of the narrow aperture that's needed, a slow shutter speed may be needed if flash is not being used so as to compensate. It's also important to make sure that image noise is kept to a minimum and so the smallest ISO needs to be set (around 100 for most cameras). It's recommended that focus is set to manual and the lens focused manually using the camera set to live view as, again due to the short camera to subject distance, the camera's auto focus might struggle to focus. The advantage of using live view is that there is usually a way of zooming in to this for more clarity whilst focusing.

Macro Lenses and adaptors

Many zoom lenses boast a macro setting but this usually only refers to close up rather than true macro. The true macro lenses that are available are usually prime lenses with focal lengths of between 50 and 180mm and generally have a wide aperture such as f2.8. These range in cost from around £300 and £1000+. A typical macro lens is shown below:



A macro lens is designed to give optimum performance at very close range but, as can be seen from the price range they are not cheap. A cheaper alternative is to use a macro adaptor. The types of adaptor that are available are described below:

The cheapest type of adaptor on the market is a Reversing Ring. As the name suggests this allows a lens to be fitted on the camera the “wrong way” round. Under normal circumstances a lens records a large object as being small on the sensor but when the lens is reversed then a small object is recorded as large. These retail at around £8 but prices may vary depending on the filter size of the lens. A reversing ring is shown below:



The one drawback with using a reversing ring with a Canon camera is that there is no manual method of closing down the aperture. There are two ways around this. The first method, one not recommended by Canon, is to firstly set the camera on AV mode, set the desired aperture with the lens the right way round and then press the depth-of-field preview button. Next, with the

button still pressed and the camera still turned on remove the lens. When the lens is removed the aperture will remain closed until it is put back on the camera the right way round. The two drawbacks to this method is that, because the aperture is closed down, the image will be dark in the view finder and, as the camera needs to be switched on during the procedure electrical charges can cause dust to settle on the sensor. The other, more reliable, method is to use an old lens that can be manually closed down. Because the lens is being fixed to the ring by its filter thread the lens does not need to be the same fit as the camera.

Next cheapest alternative is a set of close up filters. As the name suggests these just screw onto the front of the lens. They usually come in a set of different strength filters but can also be purchased individually. Apart from their low cost the other advantage in using these filters is that more than one can be used together to create even higher magnifications. A set of filters is shown below.



The main disadvantage of using them is that they are not as optically good as a macro lens and a slight softening of the edges can occur. Another disadvantage is that, if they need to be used on more than one lens, and these lenses take different sized filters, then either a set for each lens needs to be purchased or, alternatively, a set of filters to fit the largest lens can be purchased along with a set of stepping rings so they can be used on lenses with smaller filter threads.

The final two types of adaptor that can be used are extension tubes and bellows. These are similar in price although a cheap set of tubes will cost less than a bottom of the range bellows unit. These come in two types, "hot" and "cold". A hot adapter communicates electronically between the camera and lens but a cold one does not. As a result Canon users will encounter the same problem as with reversing rings when using a cold adaptor since the aperture of the lens will not close down. Although this can be overcome by using an old lens it must be a canon fit. A drawback that every photographer will encounter is that, because the lens is being moved further from the film/sensor, the aperture will be affected. The further the lens is moved from the film plane the less light will fall onto the film/sensor.

In order to get a 1:1 image ratio the amount of extension needs to equal that of the lens. So, a 50mm lens would need 50mm of extension to produce a 1:1 image. This makes telephoto lenses impractical since, even with a moderately short lens a great deal of extension would be needed. Another issue is that, because the lens is being made to focus more closely than it was designed to do, the resulting image will usually be of lower quality than with a dedicated macro lens.

Images of both bellows and extension tubes are shown below:



Lighting

Both natural and artificial lighting can be used for macro photography but the type of equipment used might need to be considered since, as already mentioned, extension tubes and bellows will reduce the amount of light hitting the sensor and so more light will be needed to light the subject or a wider aperture and or slower shutter speed might be needed. This will not be necessary when using close up filters or macro lenses although depth of field will still be a factor.

Artificial light can be provided by studio lighting or Speedlight's. If using Speedlight's the best type of unit to use is a ring light but, like macro lenses, these are not cheap with a good model retailing at a little under £300. However there are alternatives including modifiers for Speedlight's and LED lights that provide continuous and flash modes. Below is an O-Flash adaptor which fits onto a hot shoe mounted Speedlight.



This type of adaptor is available from off the internet for around £18. They come in a variety of sizes to fit different models of camera and so it's important to order the correct size.

The image below was taken with this type of adaptor. The flash used was a Canon 430EXII

Speedlight. It was taken with a Canon EOS 6D camera and Tamron 90mm f2.8 Macro lens. ISO was set to 100 and the exposure was 1/60sec at f13.



An LED unit can be purchased from off the internet for around £22 and, despite this relatively low price, produces excellent results. An example of such a light is shown below.



This particular model is the one mentioned costing £22 and is extremely versatile. It has four modes which are full continuous light, full flash, flash from the left side only and flash from the right side only. In addition to this there is a power setting so the amount of light can be increased or decreased. Although the light is designed to be screwed onto a lens (the kit includes 7 different adapters) it can just as easily be hand held.

At the top of the next page is a photograph taken with such a light. For this shot the light was set to continuous, the ISO was set to 100 and the exposure was $\frac{1}{2}$ sec at f14. The shot was set up in an Intrefit light tent in order to help cut out unwanted light and the background was lit by a single Canon 430EXII Speedlight set at $\frac{1}{2}$ power. The main light was hand held and the flash was set on a small tripod. The backlight was fired by using a wireless trigger.

