

Saturday 4 February 2017

Amateur Photographer

Passionate about photography since 1884



High ISO heroes
Which APS-C and full-frame cameras perform the best in poor light?

COMPLETE GUIDE

ISO and noise

Get great **low light** images and keep **noise** right down

- What ISO and when
- Best noise removers
- Settings of the pros

Digital ISO demystified

Where noise comes from and how it relates to sensor size & resolution

**All-new
BUYING
GUIDE**

550 cameras & lenses listed & rated

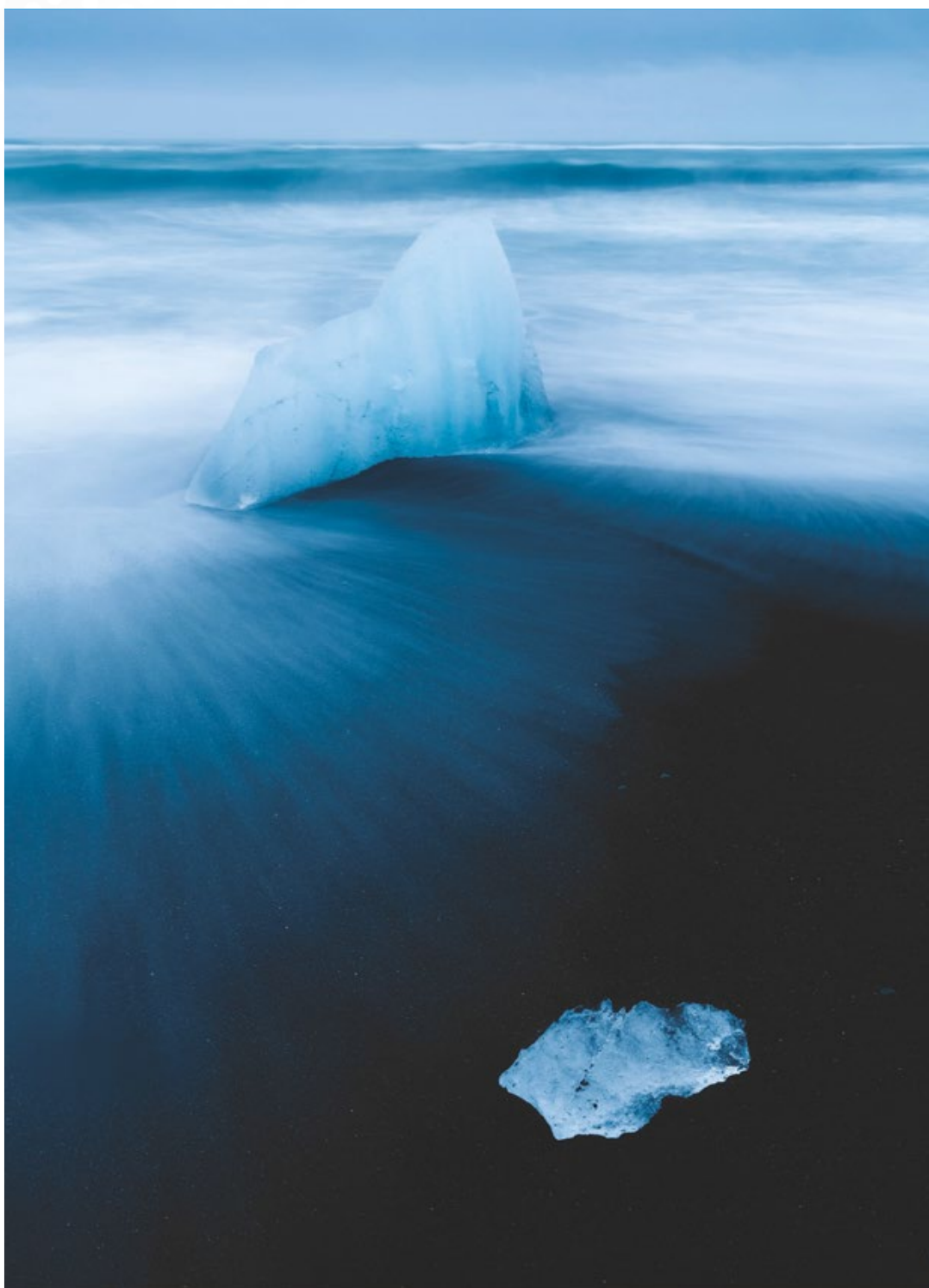
How to get pictures as good as this at high ISO

**Fujifilm
first look**

X-T20 mirrorless & X100F compact

The high ISO king? We see how Nikon's D5 copes with ice-hockey boot camp

Ice on the black sand beach at Jökulsárlón.raw

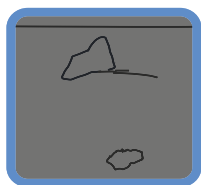


ON THE ICE BEACH IT'S A DARK, SOMBRE WINTER'S DAY.

The grey cloud is low, and the rain is steady, but the muted light is just perfect for the subject matter all around me, namely waves lapping around the artfully sculpted blocks of ice on the black sand.

Now I've seen many images of this unique combination before – it's an Icelandic photographic staple – but there's no resisting the appeal of such stark, elemental beauty. In fact it's a beauty that is enhanced by the flat lighting, a cold scene of black and blue with simple graphic appeal. But as so often is the case here in Iceland the conditions are difficult: apart from the rain, salty spray is being driven inshore off the waves and onto my increasingly crusty camera, lens and filter. So be it, such adversity is now familiar.

I want to express enough movement in the breaking waves to create graphic icy streaks against the black sand, but not so much it just becomes a milky mess. The Little Stopper filter enables me to use shutter speeds measured in seconds, which experimentation suggests is about right. Such rational analysis is of course all well and good, but every wave ensures every frame is different. I'm engrossed, revelling in the joy of photography, and hopeful perceptive art is being created. If so it's Mother Nature's work.



LEE Little Stopper



LEE Filter Holder



Canon 5D mkIII,
24-70mm lens @ 44mm,
4 secs @ f16, ISO 100

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Our new monthly camera and lens buying guide, where we list the key specs of interchangeable-lens cameras and lenses currently on the market

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Noise – along with softness, it's the bane of the modern photographer's life, as we can now all gaze at our images in excruciating detail on-screen.

As the light-sensitivity settings of today's cameras get higher and higher, is noise just an inevitable price we have to pay, like bigger waistlines after Christmas? Well, yes and no. While it's true that excessive noise can cripple an otherwise strong image, it's less and less of an

issue as ISO performance improves every year, and it can be removed fairly easily in software.

This issue is about ISO and noise, giving you the knowledge and practical skills you need to enjoy the many benefits of higher ISOs, while dealing with noise as and when it arises. We also reveal the best performing cameras at higher ISOs, and the best noise-removal tools.

And finally, don't miss our all-new buyers' guide on pages 55-66.

Geoff Harris, deputy editor

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ONLINE PICTURE OF THE WEEK



© AMAR SOOD

IMAGES MAY BE USED FOR PROMOTION PURPOSES ONLINE AND ON SOCIAL MEDIA

Snowfall by Amar Sood

Fujifilm X-T2, 50-140mm, 1/400sec at f/2.8, ISO 800

This wintry image was uploaded to our Twitter feed by Amar Sood. 'As a keen photographer, I was excited by the forecast of snow,' says Amar. 'I planned my location and prepped my gear. Unfortunately, we only received 45 minutes of light snowfall. Determined that all my prep would not be in vain, I set out to capture the scene in front of me. I decided the best way to convey it

was to use an abstract technique: multiple exposures. I wanted to freeze the falling snow in mid-air against a backdrop of green shrubbery. I knew the white and green colours would make for an appealing image. The second exposure was then slightly offset from the first to rid the image of any uniformity, as I wanted to emphasise the randomness of snowfall.'



Win! Each week we choose our favourite picture on Facebook, Instagram, Flickr, Twitter or the reader gallery using #appicoftheweek. PermaJet proudly supports the online picture of the week winner, who will receive a top-quality print of their image on the finest PermaJet paper*. It is important to bring images to life outside the digital sphere, so we encourage everyone to get printing today! Visit www.permajet.com to learn more.

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Send us your pictures If you'd like to see your work published in *Amateur Photographer*, here's how to send us your images:

Email Email a selection of low-res images (up to 5MB of attachments in total) to appicturedesk@timeinc.com.

CD/DVD Send us a disc of high-resolution JPEG, TIFF or PSD images (at least 2480 pixels along its longest length), with a contact sheet, to the address on page 25.

Via our online communities Post your pictures into our Flickr group, Facebook page, Twitter feed, or the gallery on our website. See details above.

Transparencies/prints Well-packaged prints or slides (without glass mounts) should be sent by Special Delivery, with a return SAE, to the address on page 25.

NEWS ROUND-UP

The week in brief, edited by Liam Clifford

Fujifilm launches Professional Service Scheme

To coincide with the release of its medium-format GFX 50S camera in March, Fujifilm has confirmed the launch of a European camera service, which it says is dedicated to the needs of professional photographers. For repairs and services, it promises a maximum turnaround time of 15 days. The service will cost £260 per year.

Venetian-inspired Lomo'Instant



The latest Lomo'Instant camera offering, the Murano, is inspired by the canals of Venice, and features a multi-coloured design. The Murano is available from the Lomo'Instant website or at Lomography stores for £105 in a package that includes the camera, three lens attachments and a set of coloured gel filters. Visit shop.lomography.com.



European Wildlife Photographer of the Year



© AUDIN RIKARSEN

Open to all photographers residing in Europe, the 2017 GDT European Wildlife POTY is now receiving entries. In addition to a prize pool of €25,000, the winning photographs will also be presented to the public for the first time in a high-profile exhibition touring across Europe at the tail end of the year. Visit www.gdtfoto.de.

Three new NanGuang Fresnel lights

Kenro has announced three new continuous LED lights in its NanGuang Fresnel range, the CN-60F, CN-100F and CN-200F. Built for the studio, they are not strictly 'spot' lights as they do not feature a clear lens – instead, Fresnel lights are more often used for top and back lighting. Priced from £528-£1,620. Visit www.kenro.co.uk.



© KIRSTEN QUIST

Calumet Open Day competition



Organised by Calumet Photographic, the Open Day competition is searching for 'unique, creative and captivating' pictures on the theme of 'Capture More'. People can vote for their favourite shot, which will be used on all invitations and promotional material for Calumet's Spring Capture More Open Days. The winner will also receive £250 worth of Calumet Gift cards.



WEEKEND PROJECT

The seaside out of season

Empty beaches, rough seas, Victorian architecture and brooding skies – there's plenty to photograph along Britain's coastline during winter. The Coastal Fragments series by Trevor Crone (www.themiragegroup.co.uk) is a fine example. He has spent more than a decade capturing what he describes as the 'gentle melancholy and nostalgia' of our resorts.

When planning a trip, check both weather forecast and tide timetables. Take care to protect equipment from sea spray, and walking boots are a must. Once out and about, look for signs of British eccentricity, such as hardy souls braving the sea or determined octogenarians eating ice cream in the rain.

1 Visit the beach after a storm: starfish, jellyfish, and colourful seaweed are often washed up. Also, explore rockpools at low tide for subject matter. If you own an underwater housing, you can really immerse yourself!

2 Surfers and other watersports enthusiasts are often out in inclement weather, so head out early and observe their movements. Set your camera to shutter priority and be prepared to use exposure compensation.

BIG picture

Winners announced for Outdoor Photographer of the Year 2016

◀ Images taken in the great outdoors make up the vast majority of the images we see in AP throughout the year. Any keen landscape, wildlife or travel photographer will tell you that nothing beats getting outside and watching nature reveal its majesty.

With this in mind, we find ourselves in the company of one of the category winners of Outdoor Photographer of the Year 2016. The overall winner of will be announced at the Photography Show at Birmingham's NEC on 18 March. He or she will be sent on a photography assignment to cover the epic Fjällräven Polar dog sled expedition.

Here we see the winner of the 'Live the Adventure' category. The image was taken by Kirsten Quist, who found this nicely composed and adventurous scene in Edmonton, Alberta in Canada. To learn more, visit www.opoty.co.uk.

Words & numbers

There is a job
to be done...
to record
the truth.
I want to wake
people up!

James Nachtwey
American photojournalist
b. 1948

2.5 million
Number of drones sold
in the US in 2016

SOURCE: FEDERAL AVIATION ADMINISTRATION



3 Seaside architecture, with its peeling paintwork and bright colours can make for attractive imagery. We have some amazing lighthouses in Britain, not to mention piers, bandstands and beach huts.

4 Winter is a great time for candid photography. Look for people fighting to keep their umbrellas up, pets wearing winter coats and gulls surfing the waves. Set a fast shutter speed, and don't be afraid to boost the ISO.

© TRACY CALDER


Victorian bandstands, like this one in Brighton, are a classic feature of Britain's coastal resorts





Three new Fujinon G-Mount lenses were announced at the same time as the Fuji GFX 50S

Fujifilm unveils release date and price for the GFX 50S

 AFTER unveiling its first ever digital medium-format camera at Photokina 2016, Fujifilm has lifted the lid on pricing and availability details for the GFX 50S – and announced the birth of the Fujinon GF lens line.

According to Fuji, consumers can expect the GFX 50S to be available in the UK in early March, at a recommended retail price of £6,199 for the body only.

The GFX 50S caused quite a stir when it was revealed at the Cologne trade show last year. Aimed at professionals and the higher end of the enthusiast market, it comes armed with both a medium-format, 51.4-million-pixel sensor (with an area roughly 1.7 times that of full-frame sensors) and the X-Processor Pro, previously found in Fuji's highly successful X-T2 and X-Pro2 cameras.

In terms of layout, the GFX-50S also borrows heavily from the X-T2, with analogue dials for shutter speed and exposure compensation on the top, and a rear screen that tilts in two directions, allowing its use as a waist-level finder in both landscape and portrait orientations.

At the same time, Fuji will also be releasing three fresh Fujinon lenses: the GF 63mm f/2.8 R WR, GF 23-64mm f/4 R LM WR, and GF 120mm f/4 R LM OIS WR Macro. Fujifilm says this new generation of GF lenses has inherited the design philosophy of its XF lenses, and are built especially to make use of the 51.4MP CMOS sensor in the GFX 50S and beyond – in preparation for future camera iterations, they're all designed to support resolutions of up to 100MP.

Other accessories for the GFX 50S include a vertical battery grip for ease when shooting in portrait orientation, an EVF tilt-adaptor that lets the photographer use the viewfinder from more positions, and an H-mount adapter built for mounting Fujinon HC lenses –




The GFX 50S is Fuji's first entry into digital medium format

originally developed for the Fuji GX645AF medium-format film camera – to the new camera's G-mount. Each of these is to be sold separately.

To read our full first impressions of the GFX 50S online right now, visit apmag.co/gfx50s.



Free Harvard photography course

 HARVARD University has recently made its full photography course available for interested parties to take part in online via the ALISON educational platform – free of charge.

Featuring 13 distance-learning modules, the Harvard course promises a study into the fundamentals of photography, from exposure and light through to composition and post-processing. A final module provides a full assessment of what students have learned.

The course is technically from 2009, so there may be elements that are out of date – particularly when it comes to photo-editing software and techniques. Then again, since attending Harvard costs some \$43,000 in tuition fees, it's up to the public whether that's a fair trade-off.

Visit alison.com/courses/digital-photography for more details.



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Lord Snowdon dies aged 86

LORD SNOWDON, famed for his photographs of royalty, society life and celebrities, has died at his home aged 86.

After a number of years working as a successful fashion photographer, Snowdon's marriage in 1960 to Princess Margaret, and subsequent divorce, thrust him into the public eye. Having become a member of the royal family, he soon became, ultimately, the highest-profile photographer of 1960s high society.

After starting to work for *Vogue* magazine in 1956, Snowdon became the fashion magazine's longest-serving photographer, shooting an incredible number of portraits of public figures over the course of six decades, from David Bowie and Maggie Smith to JRR Tolkien and Sir Tom Stoppard.

Commenting on Snowdon's career with the magazine, British *Vogue* editor-in-chief Alexandra Shulman said: 'Tony Snowdon was one of the great photographers of the age. His relationship with British *Vogue* over more than half a century has been one of the most important in the magazine's history. Working across fashion, portraiture and reportage, his body of work contains many of the most memorable images of the time and



© JILL KENNINGTON/HULTON ARCHIVE/GETTY IMAGES

Lord Snowdon was *Vogue* magazine's longest-serving photographer

demonstrated an eye that simultaneously framed what was before him while making that subject completely his own. His acute sense of style, his prowess as a raconteur, and his passion for his work made him a remarkable colleague and contributor.'

In 2014, Snowdon donated 130 of his most iconic photographs to the National Portrait Gallery, one of the largest gifts it has received, and was the focus of a major exhibition the same year. He is survived by his four children.

artists who have shown here. It aims to reflect something of Bluecoat's distinctive exhibition programming.'

For more details on the exhibition, visit www.thebluecoat.org.uk.



© YOKO ONO COURTESY OF SHERIDAN DAVIES

Work by Yoko Ono will be on show

Bluecoat celebrates 300 years with art and photography

TO celebrate its 300th anniversary, Liverpool's Bluecoat contemporary arts centre is hosting a special exhibition called Public View. On show from 4 February to 23 April, it features 100 of the Bluecoat's alumni artists, covering disciplines from music and dance to literature and, of course, photography.

Originally founded as a charity school in 1717, the building has played host to a huge variety of artists over the years. Over the next 300 days, the centre will show the work of internationally recognised names such as John Akomfrah, Yoko Ono and Sonia Boyce, as well as Merseyside-born and younger artists.

Artistic director Bryan Biggs, who has curated the exhibition, said: 'Even with 100 artists, this is but a small, though significant, sample of the thousands of

Get up & go

The most interesting things to see, to do and to shoot this week. By Oliver Atwell



© PITT RIVERS MUSEUM

Pitt Rivers Museum

The Pitt Rivers Museum has collected photographs ever since its foundation. Particularly strong in 19th and early 20th-century photography, the collection also contains important fieldwork archives. Now's your chance to get a guided tour.

7 February, www.rps.org/events



© TIM RUDMAN

Tim Rudman

Bradford College's Dye House Gallery is displaying the work of Tim Rudman, an award-winning fine-art photographer and darkroom printer working exclusively with film. This project shows his strange and haunting prints of Iceland.

Until 9 February, www.bradfordcollege.ac.uk



© MARK NEVILLE

Mark Neville

Child's Play brings together an exhibition of photographs, a symposium and a book by documentary photographer Mark Neville, who explores the awareness and debate around the nature of children at play.

Until 30 April, www.foundlingmuseum.org.uk

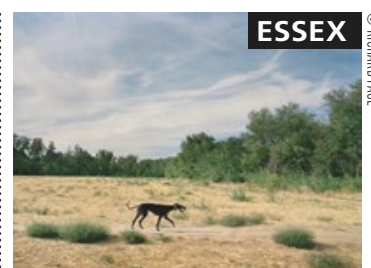


© ALISON BASKERVILLE

Documentary Photo Essays

It's one thing to create a disparate group of documentary images, but quite another to bring together a project that has a clearly identifiable narrative. Alison Baskerville is conducting a one-day workshop to show you how it's done.

11 February, www.rps.org/events



© RICHARD PAGE

Richard Page

Based on the book *The Dialogue of Dogs* by Miguel de Cervantes, this new body of work by Richard Page is a documentary project that depicts the cultural, political and economic landscape of contemporary central Spain.

Until 25 February, www.francescamaffeogallery.com

For the latest news visit www.amateurphotographer.co.uk

Fujifilm X-T20

Michael Topham takes a hands-on look at the **Fujifilm X-T20**

– a new junior model to the **X-T2** and successor to the **X-T10**

At a glance

- £799 body only
- 24.3-million-pixel X-Trans III CMOS sensor
- 2.36-million-dot OLED viewfinder
- 3in, 1.04-million-dot tilting LCD touchscreen
- ISO 200-12,800 (expandable to 100-51,200)
- New 91-point AF system

Lens compatibility

The X-T20 is compatible with more than twenty X-mount lenses, including a new Fujinon XF 50mm f/2WR (£449)

Touchscreen

The X-T20 features a higher resolution 1.04-million-dot tilting touchscreen, which improves on the X-T10's 920,000-dot tilting LCD

Design

The X-T20 shares a similar design to the X-T10, with minor changes to some top-plate controls

FUJIFILM had an incredibly busy 2016, updating its X-Pro series with the X-Pro2 and the X-T series with the X-T2. The manufacturer has followed up with a flurry of New Year announcements and key among these is the all-new X-T20 – the direct replacement to the now-discontinued X-T10. It slots into the X series as a simplified, more affordable alternative to the X-T2 and looks virtually identical to its predecessor with a boxy, high-shouldered design. However, there is more than meets the eye to this new model, and beneath its skin lie a number of differences that are intended to give it wider appeal with aspiring amateur and enthusiast photographers.

It's equipped with the same 24.3-million-pixel X-Trans III CMOS sensor that features on other current X-series models, such as the X-Pro 2 and X-T2,

and this provides an ISO range that runs from 200-12,800, expandable to ISO 100-51,200. The good news here is that the X-T20 no longer restricts raw-format recording between ISO 200 and ISO 6400 like the X-T10, and the improvements Fuji has made to the noise-processing algorithm are said to lower noise levels at high ISO. By implementing Fuji's latest X-Processor Pro imaging engine, the X-T20 springs into life slightly faster (0.4sec) with a minimal shutter lag of just 0.05sec. You might think the continuous shooting speed has also increased, but it continues to rattle out a burst at 8fps with continuous autofocus during shooting, which is the same as that in the X-T10.

The X-T20's autofocus system has been brought bang up to date with a larger phase-detection AF



The movie-rec button has been replaced by a function button



area and updated algorithm delivering an ultra-fast AF speed of 0.06sec. The number of focusing points has been dramatically expanded from 49 in the X-T10 to 91 points – expandable to 325 – with the central area of 49 points using phase-detection AF pixels. There's the usual single point and wide/tracking AF area modes to choose from, not forgetting zone AF, which gives you the option to select between a group of 3x3, 5x5 or 7x7 AF points. For the fastest focusing in zone AF area mode, users will want to select the central 3x3 or 5x5 AF zones that work with the on-sensor phase-detection AF pixels. Added to this, the X-T20 introduces five custom AF-C modes to enhance focus tracking when shooting moving subjects, just like the ones we've witnessed before on the Fujifilm X-T2. Unlike its senior relative, you're not given the option to manually adjust the tracking sensitivity, speed-tracking sensitivity or zone-area switching to create your own custom preset.

At the rear, the 3in, 1.04-million-dot screen features two-way tilt manoeuvrability and now benefits from being the touchscreen type. By turning the touchscreen setting on you're given the option to control the position of the focus point or fire the shutter in shooting mode, and by using finger gestures, much like you would on a smartphone or tablet, you can view and enlarge images easily in playback mode. The X-T20's centrally placed electronic viewfinder is the same 2.36-million-dot OLED unit previously seen on the X-T10, but

differs from the X-T2 in having a smaller 0.62x magnification. The viewfinder shows extensive exposure information, including an electronic level and live histogram, and the information display rotates when shooting in portrait format.

Other features include built-in Wi-Fi, full HD and 4K video (100Mbps), a silent electronic shutter capable of exposures up to 1/32,000sec, digital split-screen focus assist, as well as the full suite of film simulation modes that can be used both when shooting stills and recording video.

Design and handling

The design of the X-T20 bears all the hallmarks of the X-T10. The top and base plates are made of lightweight magnesium alloy, which give it a solid and robust feel in the hand, and in typical Fuji fashion the body is based around traditional analogue controls, with top-plate shutter speed and aperture dials complemented by an aperture ring on most Fujinon lenses. There's no ISO dial like you get on the X-T2 and you'll find a function button takes the place of where the movie-rec button was on the X-T10. The drive dial on the top-plate now has a video position to switch between still and video recording, and the exposure-compensation dial also has a new 'C' position to allow compensation of up to ±5EV using the front command dial. In all other respects, it's much the same as the X-T10 and continues to cater for beginners and experienced photographers alike with a top-plate mode switch that's used to toggle between auto and manual-exposure modes.

Fujifilm X100F

Andy Westlake examines the fourth generation of Fujifilm's classic fixed-lens compact



The X100F will be available in a choice of silver or black finishes

IT'S NOT so long ago that Fujifilm was best-known for its cheap identikit compacts. The camera that set it on course towards higher things was the original X100, with its retro rangefinder-style design, fixed lens, APS-C sensor and clever hybrid optical/electronic viewfinder. Now, with the X100F, Fujifilm has unveiled the fourth version of this modern classic, and very lovely it is too.

As with the previous updates, the F (for 'fourth') remains very close in spirit to the original design, with the same 23mm f/2 lens and analogue dial-led operation. But it's the most radical overhaul yet, acquiring most of the same updates as we saw on its interchangeable-lens big brother, the X-Pro2, last year. Inside, the X100F gains a 24.2-million-pixel, X-Trans III CMOS sensor and X-Processor Pro for improved image quality. The sophisticated hybrid autofocus system combines both phase and contrast detection, and feels usefully quicker than the previous X100T.

Changes have also been made



to the control layout. The X100F retains dedicated shutter speed, aperture and exposure-compensation dials alongside a manual-focus ring around the lens. However, the shutter-speed dial can now be lifted and turned to set the ISO, X-Pro2-style, and for photographers who find this inconvenient, it's possible to reconfigure the camera so the ISO can be changed using the newly added front electronic control dial. Meanwhile, a button placed within the viewfinder selector lever allows quick setting of white balance or film-simulation mode.

On the back plate, the LCD has moved all the way to the left to make space for a new joystick that's used to select between the 91 available autofocus points. This can be extremely useful when you need to focus precisely on an off-centre subject.

First impressions

With the X-T10, Fujifilm found the perfect balance of performance and price – an EVF-equipped camera with SLR-style features, but one that was still very affordable. In an effort to go one better, Fuji has implemented its latest sensor and processor technology, reworked the autofocus system, introduced 4K video, added a touchscreen and looked to add a series of subtle body refinements. As you might expect, this comes with a higher price, but at £300 more than the X-T10 was at the time of launch, the X-T20 is a slightly harder pill to swallow.

From our hands-on experience with the X-T20, we got the sense it has come on quite a way from the X-T10. It feels responsive and better equipped for shooting fast-paced subjects in challenging situations where time is of the essence. Having the touchscreen to shift the AF point around the frame is helpful, but it can be disabled. The X-T20 has many of the advanced features today's novice and aspiring enthusiasts desire without stepping too closely on the X-T2's toes. For those whose budget can't quite stretch to an X-T2, the X-T20 looks set to be the next best thing. We're looking forward to testing it soon.

FIRST IMPRESSIONS

With the X100F, Fujifilm has made another significant progression to the series, producing a camera that now feels like a really serious photographic tool. Users of previous X100 generations should also appreciate the new sensor and improved controls. Just like its predecessors, it should be one of the most desirable cameras on the market when it goes on sale in the middle of February for £1,249.



Viewpoint Jon Bentley

John Bentley gives some thought as to whether or not the hallowed 50mm lens is really worth such veneration

One of the most common photo projects advocated in magazines and on the net is going out with just a 50mm lens. In some respects it's a seductively attractive idea. Many of us have a 50mm, in part a legacy of them being standard issue with film SLRs back in the day. Even if you don't own one, they're cheap to buy new or second-hand and usually deliver superb optical quality for the money. They're also commonly associated with giving the same natural perspective as the human eye, which adds a further, intriguing element to the exercise.

Personally I've never been convinced. For a start there's the issue that most digital cameras use sensors smaller than 35mm film, typically APS-C where a 50mm lens is the equivalent of 75mm or 80mm in focal length. This sits somewhat uncomfortably between what you need for general views, and what's best for portraits. A 35mm is the real equivalent of a 50mm on these cameras but 35mm lenses aren't so ubiquitous or cheap and you don't hear so many exhortations to use one on its own.

Even if you do have a full-frame camera I'm not sure the self-imposed 50mm restriction is a great idea. I was in Oxford recently and had my venerable Nikon D3

with me as well as a 50mm Nikkor f/1.4 lens. What an ideal opportunity to see whether the 50mm magic would work.

I soon found it didn't. It wasn't wide enough for architectural shots but far too wide to isolate interesting details. In practice I didn't experience the much-vaunted 'human eye' perspective.

The whole exercise became more annoying when I walked past Ducker & Son, the famous Oxford shoe shop that opened in 1898. A notice in the window informed me that this slice of retailing heritage was about to close. Clearly I needed to make a photographic record.

Alas, with my 50mm I couldn't get wide enough to shoot a full exterior view or an interior one. Tighter shots of details like the hanging shop sign were also out of the question. If only I'd brought a zoom.

Fortunately I had my iPhone and took some reasonable wideangle shots of the shopfront, and proprietors Bob and Isobel Avery in the quaintly historic interior. The results won't be winning any prizes but they're better than I could have achieved with my 50mm alone. This is one exercise I won't be repeating any time soon.

Jon Bentley is a TV producer and presenter best known for *Top Gear* and Channel 5's *The Gadget Show*



Isobel Avery at the historic shoe shop, Ducker & Son, taken with Jon's iPhone

Do you have something you'd like to get off your chest? Send us your thoughts in around 500 words to the address on page 25 and win a year's digital subscription to AP, worth £79.99

Social life

Here are some of our favourite images from the world of social media this week



Twitter @photosABP

Any photographer with children surely has a bundle of images to cherish. This one from Andy Parslow is a sneaky shot taken round the corner of his daughter's bedroom as she relaxes with a yoghurt and some light entertainment.

Join the conversation @AP_Magazine



Artyom Liss

What looks like a tilt-shift image of fully grown trees is actually a shot of frozen plants in Moscow, Russia. Artyom captured

this image with a Russian Helios 44 lens, which he bought for £15, complete with an M42 Fujifilm adapter.

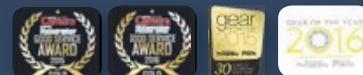
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Tim Coleman @timothy_coleman

Former AP technical writer Tim Coleman offers up a beautiful shot of a ladybird making trails across a window misted by condensation. It goes to show – always keep your eyes open.

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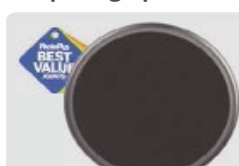


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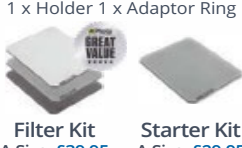


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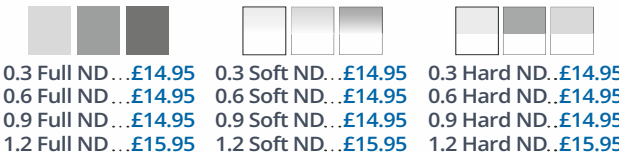


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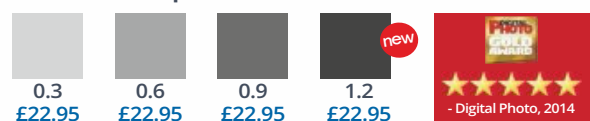
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Technique NOISE CONTROL

Don't be afraid to boost the ISO sensitivity – this picture was taken at ISO 3600, but noise levels are still well controlled





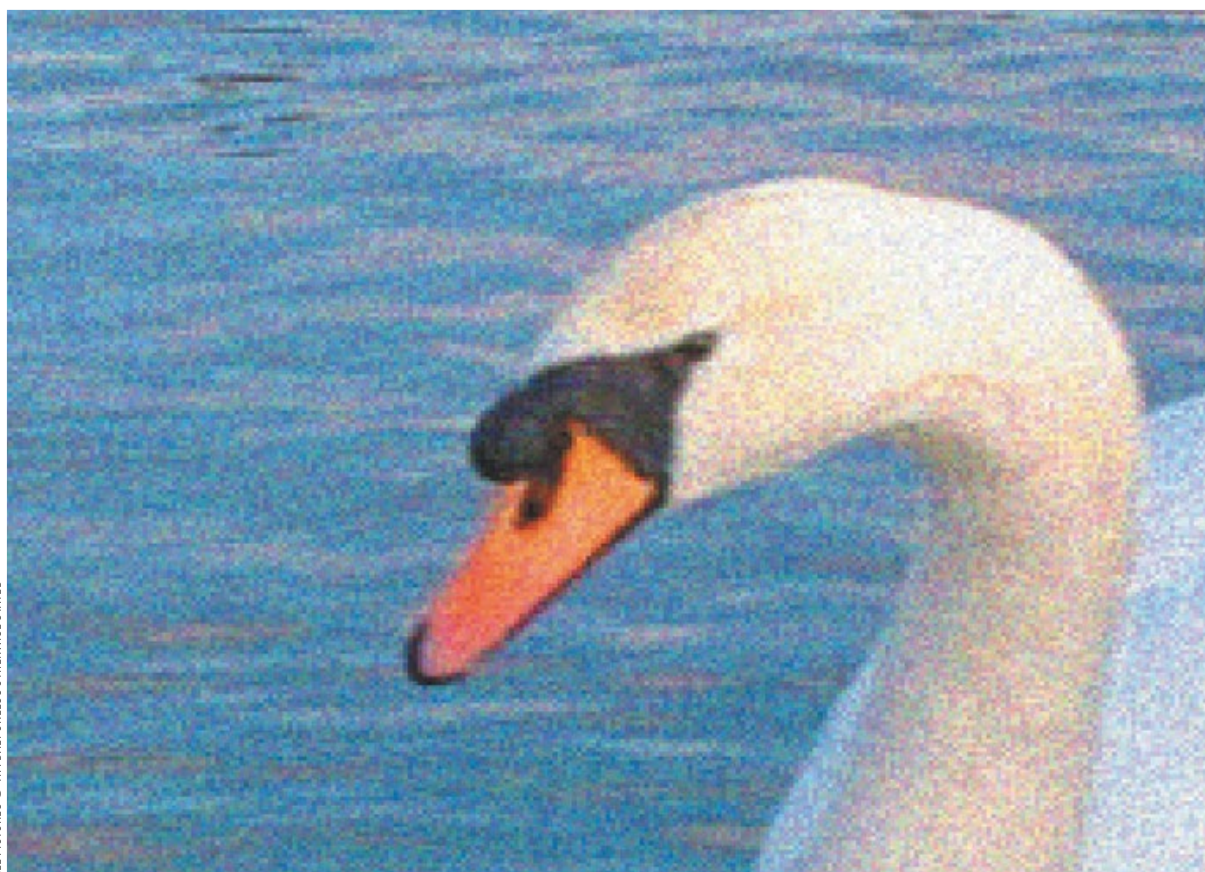
Tim Daly

Tim is a photographer, teacher and author. He has written numerous books on digital production, printing and the creation of photo books, and currently teaches photography at the University of Chester, and for the RPS in Bath. To find out more, visit www.timdaly.com.

Complete guide to noise

Noise is the downside of ever greater low-light sensitivity, says **Tim Daly**, so it's essential to know how it's caused and how to minimise its effects

Noise is an unwanted by-product of digital photography and usually shows itself as speckled pixels of an unexpected colour or brightness. It's a disruption to the smooth gradations of colour that we have come to expect from our digital images. We generally encounter two types of noise: shot noise, which is created by fundamental variations in light; and electronic noise, which is the result of our camera's internal processing. Regardless of the kit you use and the subjects you shoot, noise forms part of everyone's workflow, so it's essential to know how it's caused, how to manage it and how to minimise its effects. ➤



ALL PICTURES © TIM DALY UNLESS OTHERWISE STATED

Noise becomes particularly visible when an image is enlarged

Despite being shot at ISO 1600, this candid portrait shows no signs of noise as it was taken with a full-frame DSLR



© LEEFROST

Shot noise

The raw material for all photography is, of course, light, and this is made up of tiny packets of particles called photons. Our brains process out the minute delay in these multiple packets of light reflecting off our subjects, so we are never aware of the quantum nature of light – we never think of it as a discrete amount.

An easier way of thinking about light hitting a sensor is to visualise it as rain falling into buckets (the photosite cells on your sensor). When a light shower of rain falls, it is collected in some but not all adjoining buckets, yet when there's a downpour most of the buckets will capture a similar amount of water. So, during intense rainfall the variation in collected water between buckets is not very significant, but during intermittent rain some buckets will remain dry so the difference will therefore be greater.

Moving back to light, when the flow, or intensity, is great, there's little variation or noise. However, when the intensity is low, there's much more variation or noise. In photographic situations, different amounts of light fall on different parts of the subject, creating highlights, midtones and shadows. Noise is most noticeable in the shadow areas. To minimise shot noise, it's important to make your exposures as accurate as possible. For optimum results, shoot raw and always expose to the right.

Electronic noise

In addition to this fundamental variation in light and how your sensor receives it,

noise can also be introduced by your camera's electronic processing of light, or amplification. As with other electrical systems, when the balance between useful information (strength of signal) and distracting background interference (noise) becomes visible, it can lead to problems.

Electronic noise occurs differently in different cameras: a small amount is introduced when light is converted into a signal by the photosite, but the most significant contributor is the amplifier, which comes into play at high ISO sensitivities – magnifying low levels of light.

Luminance and chrominance noise

Although there are many different kinds of noise, generally all noise can be broken into two components: luminance (pixel brightness) and chrominance or chroma (pixel colour).

Luminance noise is the more difficult to correct as it's linked to preserving fine details within an image, so when luminance is smoothed image sharpness falls. Chrominance noise is the easier of the two to remove, but its correction must be undertaken carefully to avoid desaturating areas of the image.

Sensor size and noise

Not all digital sensors are the same size and neither are their light-receiving cells, or photosites, which are packed side by side on the sensor surface. Many small-sensor cameras that boast of high megapixel values have a high density of smaller photosites crammed together in a small space.

At the other end of the market, full-frame sensors found in professional DSLRs are bigger (but not necessarily



Chrominance noise is recognisable as random coloured pixels within solid areas of your image





Small-sensor devices such as camera phones make a poor job of noise reduction when used at high ISOs. This was shot at ISO 2500



higher resolution) and have less densely packed photosites of a larger size. Yet the most important issue is that a full-frame DSLR has a sensor which is four times the area of a Four Thirds camera sensor, so the Four Thirds device produces an equivalent exposure using a quarter of the amount of light compared to a DSLR.

Therefore, smaller sensors densely packed with smaller photosites can be very noisy at mid and high ISO values, as they create a weaker signal that requires more amplification, which in turn creates more noise – hence they have a low signal-to-noise ratio.



Luminance noise is mostly monochrome and looks like film grain

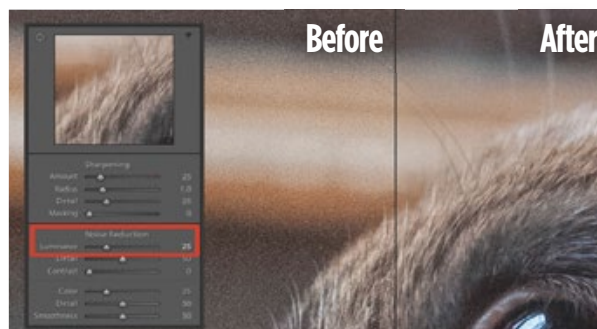
NOISE CONTROL IN LIGHTROOM

For processing raw files, Lightroom provides intuitive noise-reduction tools in the Detail panel. On import, Lightroom automatically recognises raw files and applies a preset noise-reduction process, but you can customise this for your DSLR and, even better, for its different ISO speeds. The golden rule is to process out as much noise as possible before sharpening your image.



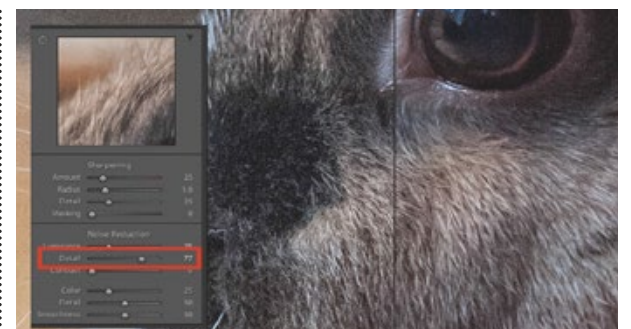
1 The starting point

This image was shot as a full-resolution raw file at ISO 6400 and viewed in Lightroom at 400%. On inspection, we can see luminance noise clearly in the smooth defocused areas in the background, as well as some further noise in the animal's fur.



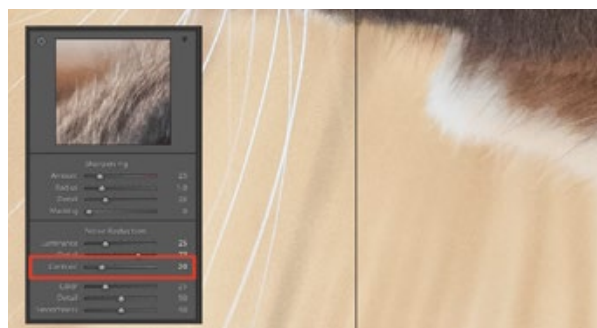
2 Increase Luminance

Arrange your desktop to show a Before/After view. Increase the Luminance slider until the noise softens, but not so much as to lose sharpness. This example has had +25 increase. You don't need to remove the entire noise texture otherwise the image will look odd.



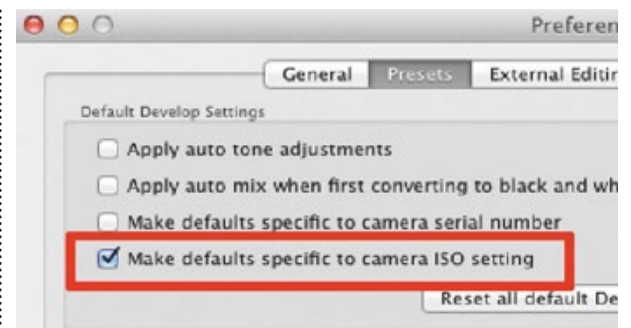
3 Push Detail

By default, the Detail slider will be set at +50, so move this up until you see sharper detail. The downside is that as Detail is increased, unwanted noise can reappear. Low amounts of Detail will create a softer result, which may be acceptable for smooth-textured images.



4 Explore Contrast

The final control is to experiment with the Contrast slider. Contrast works by blending areas in your image together, so they appear less visible in the end result. Like Detail, use Contrast sparingly, and if it makes no difference leave it on its default value of 0.



5 Customising your DSLR

You can create preset NR for your DSLR and each ISO in Lightroom. Open Preferences and click on 'Make defaults specific to camera ISO setting'. Open a file shot at a specific ISO and make the adjustments. Then choose Set Default Develop Settings from the Develop menu.

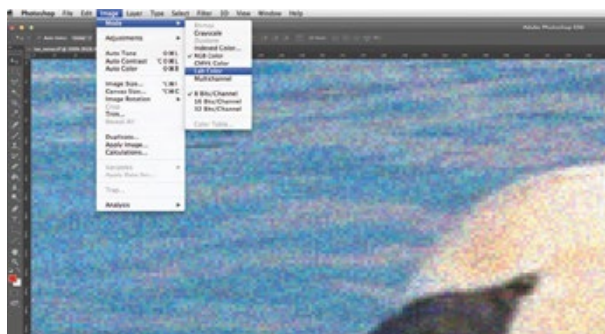
COLOUR NOISE CONTROL IN PHOTOSHOP

Most Photoshop users undertake their raw-file noise reduction in Camera Raw using an almost identical set of tools to those in Lightroom. However, Photoshop's ability to work with channels and edit in the theoretical LAB colour space helps it to deliver an alternative way of dealing with chrominance noise.



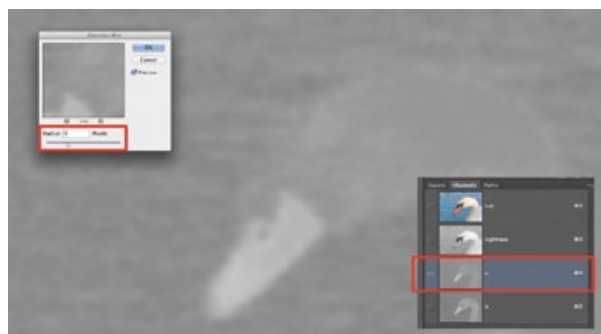
1 Starting point

This is an extreme example of chrominance noise taken with a small-sensor camera phone. Patches of coloured pixels seem to 'infect' the pure whites and blues of a daylight image. We are going to remove as much of the colour as possible without compromising sharpness.



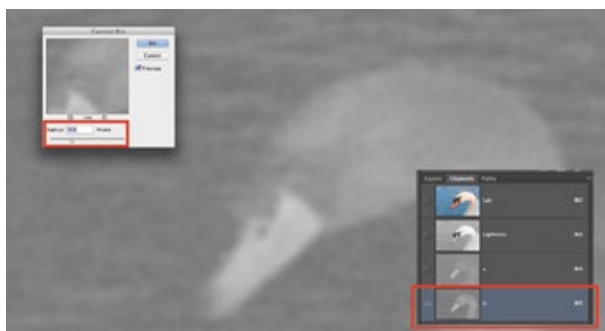
2 Convert to Lab mode

Open your image in Photoshop and go to Image>Mode>Lab Color. This turns your three-channel RGB file into a Lab colour image that is split into a single Lightness (luminance) channel, with the colour components kept separately in channels a and b.



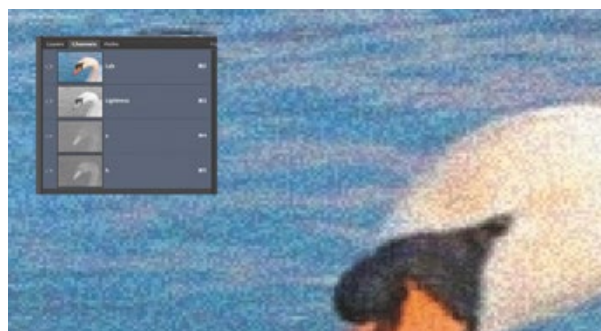
3 Edit the 'a' channel

Open your Channels palette and click on the single 'a' channel – making the desktop image turn monochrome. From the Filters menu choose Blur>Gaussian Blur and increase the Radius value until sharp shapes start to soften, as shown.



4 Edit the 'b' channel

Repeat Step 3, but this time on the 'b' channel, as shown. Because the Lightness channel contains the sharpness information, but not colour, you can edit channels 'a' and 'b' without softening the image.



5 Final result

To reveal the results, click on the master Lab channel to switch it all back on, as shown. You will notice that random colour noise is largely absent, but the image will still remain sharp.

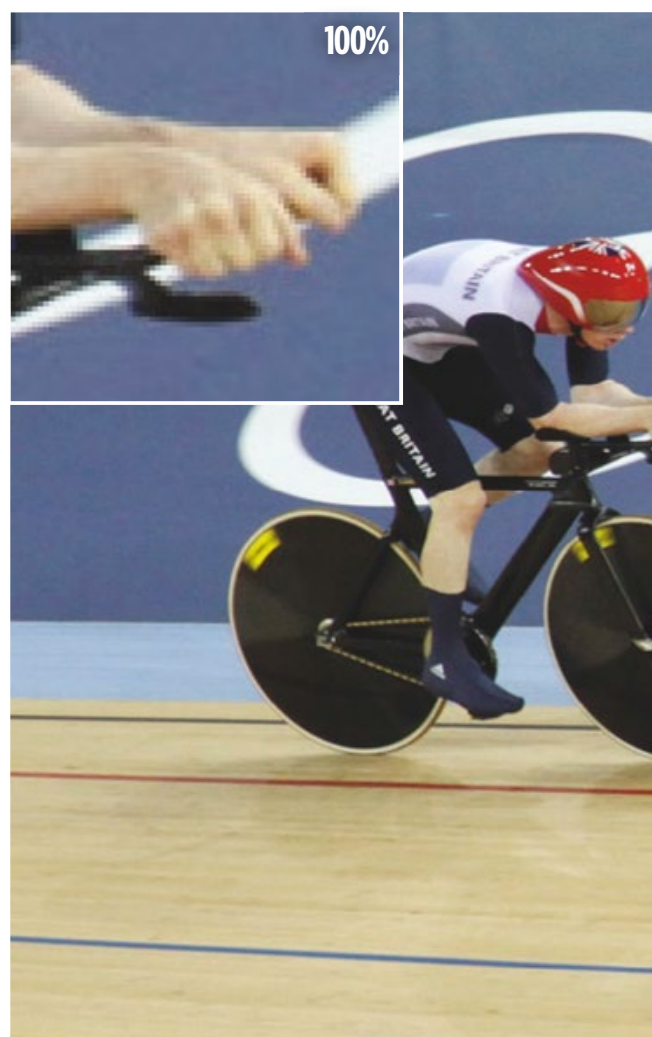


Film grain can have a pleasing granular appearance, which becomes more apparent in bigger prints

Film grain and digital noise

Although there are some visual similarities between film grain and digital noise, they are produced by very different circumstances. Grain in film becomes visible in a print as a result of the development of silver-halide crystals in the film emulsion. News and sports photographers typically 'pushed' the working ISO of film from 400 to 1600 by extending its chemical development longer than usual. Like copper-sulphate crystals grown in a test tube, the longer the film was developed, the bigger the crystals grew and the more visible the grain became.

While the grain characteristics of certain films, such as Kodak Tri-X, were





Images shot at ISO 800 show little noise when processed properly and printed at A4 or smaller

used as a visual effect by photographers such as William Klein and Daido Moriyama, digital noise is seen much more as an unwanted electronic by-product than a stylistic choice.

Practicalities of noise

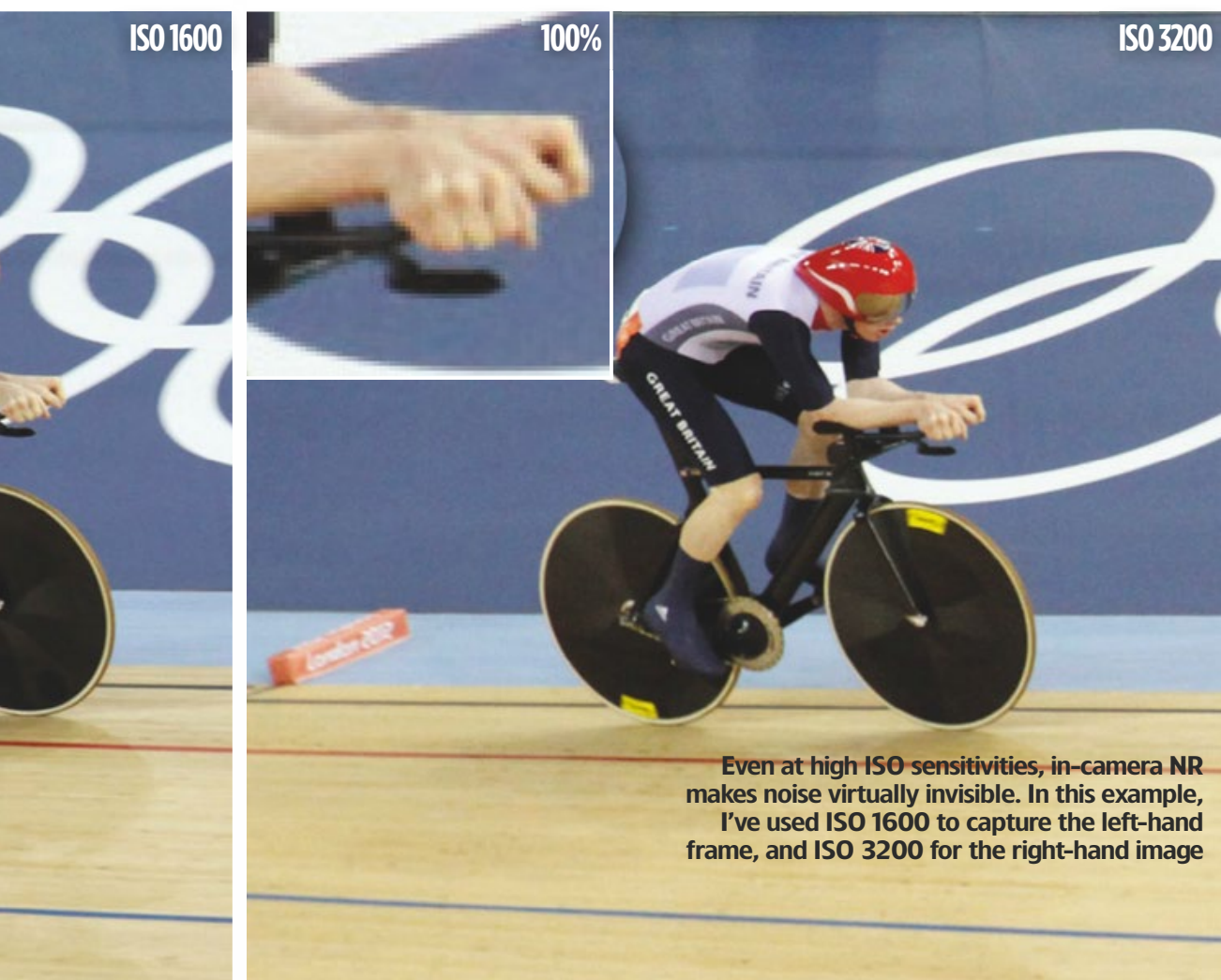
During the rapid development of camera technology, noise has become a byword for all that's bad about digital, yet in reality it's much less of an issue than you think. Today's professional DSLRs provide exceptional image quality with much lower levels of noise compared to earlier camera systems.

Shooting such quality at high ISOs results in many new possibilities. We can now shoot subjects and situations that would

have been tricky to capture previously, such as moving subjects in low light, or using atmospheric ambient light rather than flash to retain the mood. For black & white photographers, noise has much less of a visual impact on the final product as it can be easily disguised using post-production techniques in Lightroom or Photoshop.

Controlling noise in-camera

There are two types of noise-inducing scenarios that better DSLR systems can mitigate against: noise created by long exposures and noise created by high ISO settings. As each of these scenarios produces slightly different kinds of noise, two separate in-camera processes address them.



Even at high ISO sensitivities, in-camera NR makes noise virtually invisible. In this example, I've used ISO 1600 to capture the left-hand frame, and ISO 3200 for the right-hand image

Useful camera settings

File formats and NR reduction

Like all other on-board camera settings, noise-reduction settings affect only JPEGs and are not embedded into raw files.

Post-processing noise in raw files

If you use your DSLR's propriety raw file processor, such as Nikon Capture NX-D, this will make full use of the data embedded in the raw file to trigger a more sympathetic noise reduction than a third-party post-production application such as Photoshop or Lightroom. The third-party application won't differentiate between different NR reduction settings the camera has used.



Noise and heat

Higher than usual sensor temperatures can also cause unexpected noise to appear in your images, even at low ISO values. Shooting with live view for extended periods of time can cause the camera's internal temperature to rise, for example, so it's always advisable to switch this off between shots, especially if you are also shooting long exposures and/ or using high ISOs. While this may not be an issue for mirrorless cameras, which are designed to be used with full-time live view, they are cited as a possible cause of noise in most recent DSLR camera manuals.



Auto ISO dilemma

Most DSLRs have an additional setting that keeps the ISO value fluid throughout your shoot, so you can maintain a chosen aperture or shutter speed setting depending on the subject you're shooting. Most cameras allow you to set a ceiling value for auto ISO so you don't inadvertently shoot at too high a value, such as 6400. For high-speed shooting in changeable conditions, where the emphasis is on freezing motion rather than controlling noise, auto ISO can be very useful.



A good way to test the noise tolerance of your DSLR is to shoot the same image at different ISO values and see how high you can go before noise becomes apparent. This example is shot with a Nikon D3 at ISO 800

➤ Noise-reduction limitations

Most in-camera noise-reduction techniques involve complex on-board processing that will slow down your workflow. Depending on the method used, NR processes can reduce your burst rate if you are shooting multiple frames per second, as the system struggles with the data before allowing you to shoot again.

So, if you are shooting high-resolution files of fast-moving subjects, and you have high ISO noise-reduction switched on, you may find that you fill your buffer up quickly, and are unable to shoot as many frames as you expect.

Noise and ISO values

ISO is a term used in photography to indicate the light sensitivity of your sensor or film stock. Compared to 10 years ago, digital-camera sensors are designed to produce acceptable images under a much wider range of low-light conditions. But generally, it's still a good idea to use low ISO values, such as ISO 100 or 200.

Like shutter speeds, ISO values follow a linear scale such as 100, 200, 400, 800, 1600, 3200, 6400, and as each of these values doubles the sensor requires only half the amount of light to work effectively. When the ISO value is halved from 400 to 200, the sensor requires twice the amount

of light to obtain a correct exposure.

Low values such as ISO 100 are selected when shooting in bright conditions; higher values such as ISO 800 are used when less light is available.

Native or base ISO

Unlike film, which has a fixed ISO, digital sensors operate across a wide range of ISO values, typically 100-6400, while some pro DSLRs keep doubling up to stratospheric values such as 102,400.

In order to facilitate this huge range of sensitivity, sensor manufacturers design their products to work in three different modes. At its native or base ISO, typically 100, the sensor operates at maximum quality and produces little or no noise at all. (Although camera manufacturers never advertise the native ISO of their DSLRs, this is almost always the lowest ISO value such as 100 or 200 – excluding other settings marked 'expanded' or 'low').

Once you increase ISO from its native value, the camera electronically amplifies the signals from lower light levels. In this secondary mode, noise begins to appear as amplification increases.

A third mode, sometimes referred to as boosted, expanded or extended ISO, makes shooting possible at extremely high ISO settings by employing a software

process to simulate speed gain rather than electronic amplification. In this setting, noise will be very visible and there will also be a drop in dynamic range.

Risky intermediate ISO settings

In the same way that analogue photographers once experimented with film speed and development times to determine optimum ISOs, digital photographers have tested noise performance across a range of ISO settings and unearthed some interesting findings.

While we assume that the amount of noise increases as we increase the ISO, there's plenty of evidence to suggest that intermediate settings can actually increase noise more than you might expect.

For recent Canon DSLRs, there's evidence that intermediate ISO settings, such as ISO 125, create the same amount of noise as ISO 200, with the effects mostly visible in extreme shadows. This is due to a crude internal process that appears to amplify noise at these values.

Post-production noise control

If you shoot raw files, or prefer not to suffer buffer delays as a result of using in-camera NR, then controlling noise in post-processing is the best option.

AP

Best full-frame cameras for low noise

Canon EOS-1D X Mark II

With a top native ISO speed of 51,200 (expandable to 409,600), this 20.2MP full-frame DSLR is perfectly suited to low-light shooting. Even in auto mode, it can achieve shutter speeds up to 1/8000sec.



Nikon D5

Combining a 20.8MP FX-format sensor with Expeed 5 technology, the Nikon D5 has a native ISO of 100-102,400, expandable to ISO 3,280,000. The AF system is designed to perform in near darkness (-4 EV).



Sony Alpha 7R II

The palm-sized Sony Alpha 7R II has a back-illuminated 42.4MP full-frame sensor, and an ISO range that can be set as high as 102,400. The Bionz X image-processing engine finely tunes data for clearer, more natural images.



In-camera noise-reduction (NR) options

ISO noise reduction is applied automatically by your camera's on-board systems at all ISO values above its base or native setting.

Long-exposure noise reduction

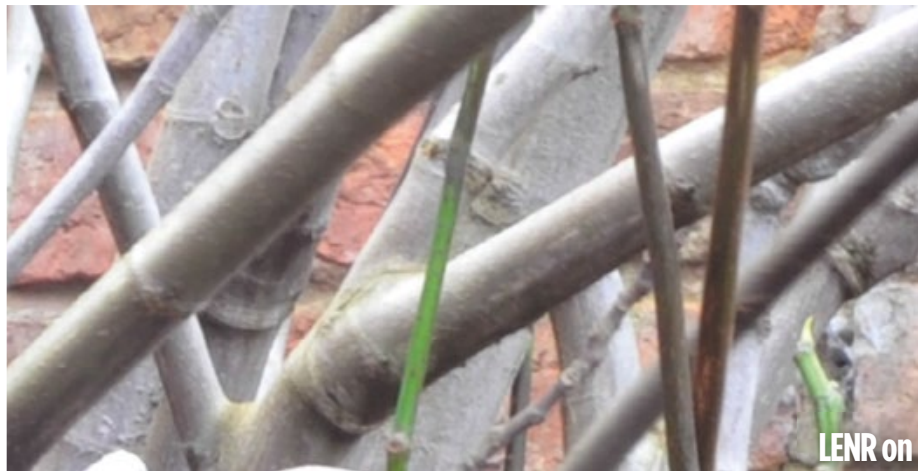
This isn't quick and will usually take at least twice as long as your original exposure time. Although there are different methods of long-exposure noise reduction, the process usually involves the creation of a second 'dark' frame, which is combined with the original to subtract the noise.

High ISO noise reduction

Most DSLRs have a range of high ISO NR options such as Standard, Low, Strong or Disable. While Strong NR will be effective on high ISO speeds, it will also slow down your burst rate. Experiment to see which works best for your particular workflow.

Multi-shot noise reduction

Many camera systems offer a third method of NR, which combines multiple shots into a single frame. Suitable for non-moving subjects, it's a bit like HDR for noise reduction.



On a two-second exposure, long-exposure noise reduction smooths out unwanted noise, but slightly at the expense of detail and texture



These three examples were shot as JPEGs at ISO 3200, with varying levels of in-camera noise reduction applied

Best APS-C cameras for low noise

Nikon D500

The standard ISO range of the Nikon D500 (100–51,200) can be lowered to 50 or expanded to 1,640,000 (equivalent). The smaller sibling of the D5, this APS-C DSLR is not afraid of the dark, and handles highlights well.



Fujifilm X-T2

The Fujifilm X-T2 features a 24.3MP X-Trans CMOS III sensor with no low-pass filter, delivering superb image quality. The native ISO range stretches from 200–12,800 and can be expanded to 51,200.



Sony Alpha 6500

The Bionz X image-processing engine in the Sony Alpha 6500 enhances picture clarity, while minimising noise. It boasts a 24.2MP sensor in a tough, palm-sized body, and an ISO range that can be expanded to 51,200.



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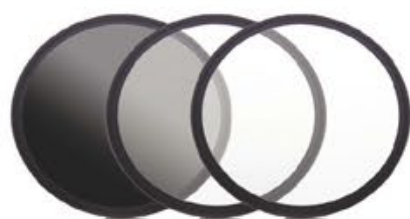


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The ISO setting on a digital camera does something rather different than changing to a different speed film



Digital ISO VS Film ISO

Andy Westlake explains what the ISO setting on your digital camera really does

Back in the good old days when we were shooting film, ISO was a pretty simple concept. Each film type had a given speed and that's what you'd use. Lower ISO films gave better results, with finer grain and detail and more saturated and realistic colour rendition (or with black & white,

better tonality). High ISO films were, to tell the truth, pretty grainy: I remember using colour print and slide films around the ISO 800-1000 mark and being hugely disappointed by the results. I sometimes used Ilford Delta 3200 black & white film to shoot indoors without flash, but only to make small prints.

In essence, the film speed rating was a fundamental property of the emulsion – high ISO films were physically and chemically different from their low ISO cousins. If you processed your own black & white film you could adjust the ISO by manipulating the processing, but only by a stop or two. However colour film used standardised processes so there was little scope for manoeuvre.

Because of this, changing the ISO sensitivity during shooting meant using a different film. But if you just had one camera body this wasn't really practical on a shot-by-shot basis. You'd have to rewind your film, making a note of the next frame number, and load another of the speed you wanted to use next. Then to change back you'd have to reload the first film and fire off a series of blank shots to advance to the next available frame. So serious photographers would often be caught carrying several cameras loaded with different films. Those lucky enough to use medium format had the luxury of interchangeable backs.

Then of course came digital and the ability to change the ISO on a whim. But what does this mean, in terms of how the camera and sensor actually work?

Digital and Variable ISO

When I got my first digital camera, the ability to change ISO on a shot-by-shot basis brought a wonderful new freedom to shoot in a wider range of light conditions. In 2017 we're now pretty disappointed if a camera doesn't give good results at ISO 1600 at the very least. Of course higher ISOs suffer from familiar penalties, with ever-increasing noise bringing decreased detail and poorer colour rendition. But even so we've seen some extraordinary cameras recently that give reasonable results right up to ISO 51,200 or so, such as the Nikon D500.

Despite our familiarity with ISOs that can be changed at will, and cameras that work across a huge range of settings, it's fair to say that many photographers



Digital cameras make it easy to change the ISO for each shot

probably haven't given much thought to how the ISO control on their camera actually works. But understanding this can help with using your camera to get the best results.

How does digital ISO work?

It's tempting, when changing your camera's ISO setting, to think that it's like changing the film, with the control manipulating how the sensor reacts to light. But in fact it does nothing of the sort – changing the ISO has no influence whatsoever on the sensor itself. Instead, alongside changing the light metering, it changes the way the camera processes the data that's read from the sensor after the exposure, with the aim being to give the best possible results with the weaker signals that are generated when the sensor is exposed to less light.

To understand what this means, we need to consider how a digital camera actually makes an image file – either raw or JPEG. When the sensor is exposed to light, each of the pixels builds up an electrical charge, dependent

upon how much light it receives. This is read off the sensor as an analogue signal, and needs to be converted to a digital value so the camera's processor can convert it to an image file. This is done using one or more analogue-to-digital (A/D) converters. The digital image data can then be recorded as a raw file, or further processed to make a JPEG.

However, each stage of the process can add undesirable noise to the image. Crucially, if the signal fed into the A/D converter is too weak, then it can be overwhelmed by the noise added at this stage, making the image file unusable. For this reason, an amplifier is placed between the sensor and A/D converter to boost the signal. In the simplest terms, increasing the ISO setting on your camera introduces more amplification at this stage, so that

Where does noise come from?

Of course even the best cameras still show ever-increasing noise in their image files as the ISO is increased, so where does this come from, if not from the camera's electronics? The answer is from the nature of light itself.

Light is made up of discrete particles called photons, and most of the noise in our images is due to the fact that adjacent pixels don't capture exactly the same number of photons, and therefore record exactly the same signal, when they're exposed to an even intensity of light. If the light levels are high, the differences are barely visible, so noise is minimal. But as the illumination falls, the variation between the pixels increases, so noise becomes increasingly more obvious. Put simply, the lower the light, the higher the noise, due to the particulate nature of light.

Where noise from the camera's electronics does matter is mainly in the dark tones of the image file. Here, read noise from any step of the signal pathway can swamp details in the image itself. In practice this tends to limit both the highest usable ISO setting, and the deepest shadow detail that can be seen in raw files.

Pixel count and noise

In the early days of digital, it became received wisdom that the more pixels a sensor had, the higher the noise levels would be. With older cameras this looked self-evident: higher pixel count sensors could certainly give more resolution, but at the expense of poorer results at high ISOs. For example, in late 2008 the 12-million-pixel Nikon D700 full-frame DSLR gave clearly better results at ISO 3200 or higher than the 24-million-pixel Sony Alpha 900, even when the latter's files were downsampled to match the D700's. But sensors have progressed significantly since then, and this 'rule' no longer necessarily holds. In fact, if we look at the evolution of cameras since then, megapixel counts and high ISO capabilities have gone up hand-in-hand. Today's 24-million-pixel APS-C cameras give vastly better high ISO capability compared to the 12-million-pixel cameras we were using 10 years ago.

It's still true that if we examine images at the pixel level, and particularly if we refuse to apply any noise reduction, sensors with higher pixel counts give noisier images. But if we compare them at the same output size, the differences now all-but disappear.



Sony Alpha 7 II



Sony Alpha 7R II

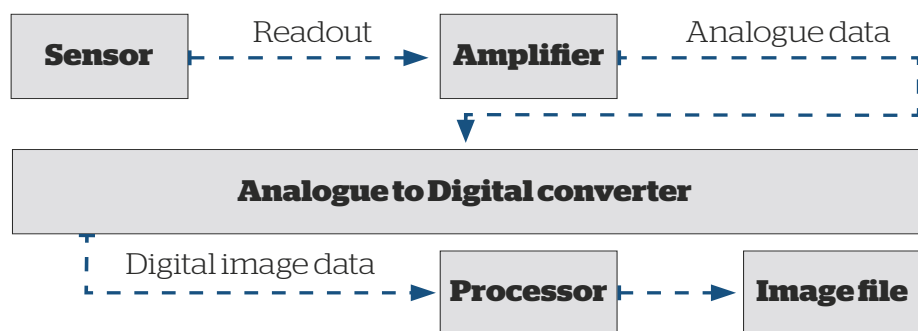


Sony Alpha 7S II

Comparing files from the A7 II, A7R II and A7S II at ISO 12,800 shows that higher pixel counts don't necessarily always mean increased image noise

The best example is Sony's Alpha 7 II triplets: the 12-million-pixel A7S II, 24-million-pixel A7 II, and 42.4-million-pixel A7R II. Of these, the A7 II actually performs worst at higher sensitivities of ISO

6400 or more, with the A7R II's incredibly impressive sensor only starting to fall behind the A7S II at ISO 51,200 or more. So it's the quality of the sensor that matters, not the number of pixels.



Raising the ISO setting increases the amplification of the analogue signal read from the sensor, prior to its conversion to a digital output

weak signals from the sensor can be successfully converted to digital output. The amplifier may itself add noise, but as long as this is much lower than the signal it outputs, the process is beneficial.

The various forms of electronic noise added by the camera are collectively referred to as 'read noise'. In practice, they tend to limit the highest usable ISO, and the maximum dynamic range at low ISOs. On older cameras this could be significant, but more

recent models have done a remarkable job in reducing it to very low levels indeed. This means that the files they produce are very accurate representations of the data originally recorded by the sensor, regardless of how much light any individual pixel received. This brings some key benefits – not only are very high ISOs more usable, but photographers can also recover more detail deep into shadow areas of low ISO files.

'ISOLESS' CAMERAS

Now you might be wondering if modern cameras can record low-level signals very accurately, why do they still add an amplification step prior to A/D conversion. As it happens, on the best modern cameras it's not really necessary, and in terms of image quality you'll get similarly good results to using a high ISO by shooting with a low ISO setting (and therefore underexposing), then pulling-up the image brightness in post-processing. Indeed this is the basis of the highlight dynamic range expansion modes found on Canon, Fujifilm and Pentax cameras.

The advantage of shooting this way is that you can avoid clipping highlight detail, and retain a very broad tonal range in your raw files. Naturally some cameras work better than others in this respect, and you'll find some people refer to the best performers using the somewhat confusing term 'ISOless'. However working in this fashion can have operational disadvantages: for



Nikon D810 , ISO 100, -5EV



Nikon D810, ISO 3200

On the Nikon D810, underexposing by 5 stops at ISO 100 and adjusting in raw processing gives the same noise as shooting at ISO 3200

example you'll often end up with files that are too dark to be useful for viewing images in playback.

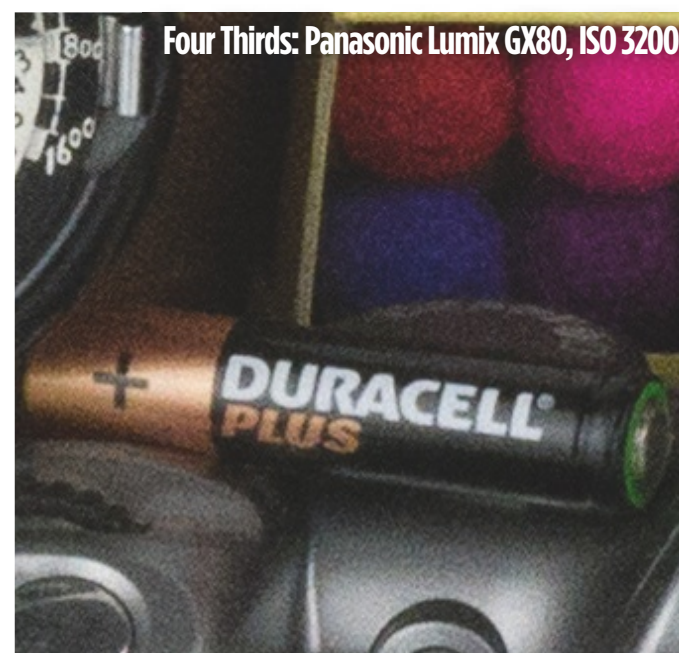
Sensor size and noise

The fact that most of the noise in our photos comes from the light itself also explains very well why larger sensors perform better at any given ISO setting. There are several ways of framing the explanation, but the simplest is that for a given shutter speed, aperture setting and light level, a larger sensor simply captures more light overall, essentially in direct proportion to its area. So there's roughly a stop's worth of improvement at each step in the progression of the most common sensor sizes: 1-inch, Four Thirds, APS-C, and full frame.

This means that in theory, images will look similarly clean at ISO 100 on a 1-in sensor camera, ISO 200 on Four Thirds, ISO 400 on APS-C, and ISO 800 on full frame – and in practice these do indeed all tend to look clean and practically noise-free. Likewise you can expect similar amounts of high ISO noise at ISO 1600 on 1-in, ISO 3200 on Four Thirds, ISO 6400 on APS-C, and ISO 12,800 on full frame. Again, in our experience this reflects the highest settings that usually give good results in practice, before noise becomes overly intrusive. However some cameras do give usable results at higher ISOs.



Full frame: Canon EOS 5D Mark IV, ISO 12800



Four Thirds: Panasonic Lumix GX80, ISO 3200

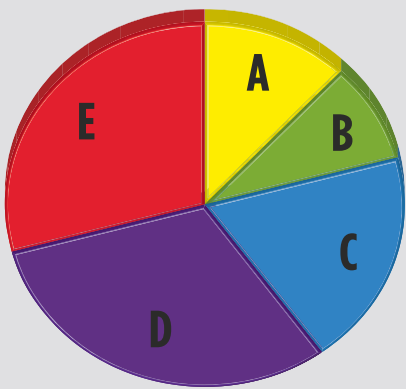


APS-C : Sony Alpha 6500, ISO 6400



1-in: Panasonic Lumix FZ2000, ISO 1600

This comparison illustrates how high ISO noise depends on sensor format. Each step-up in size equates to approximately double the sensor area and a corresponding 1-stop improvement in high ISO performance



In AP 14 January, we asked...

Will video capability be an important consideration when you buy your next camera?

You answered...

A Yes, I'd now only buy a 4K-capable camera	12%
B Yes, but full HD with manual control is enough for me	9%
C Not really, I only shoot video clips occasionally in auto mode	19%
D No, I don't shoot video	31%
E No, I don't want video on my camera at all	29%

What you said

'I voted "No I don't want video". Many years ago, 8mm or Super 8 home movies were only a few minutes long and expensive to make, so however bad they were the audience didn't have to suffer for long. But now they are virtually free to make, and can be much longer, but are no more interesting.'

'Only if buying a video camera. Personally, I don't see the point in having video on a stills camera.'

'Can't understand this apparent aversion to video. It's increasingly used in place of stills on newspaper websites. My first love remains stills, but I'm not closing my mind to the movies.'

'It was a consideration when I bought my Fujifilm X-T1. I did think about one of the Sony Alpha 7 versions, but in the end decided I couldn't justify £2,000-plus.'

Join the debate on the AP forum

This week we ask

Do you print your images at home?

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- 1 Leica M10 first look review
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LETTER OF THE WEEK

What's the point of film simulation?

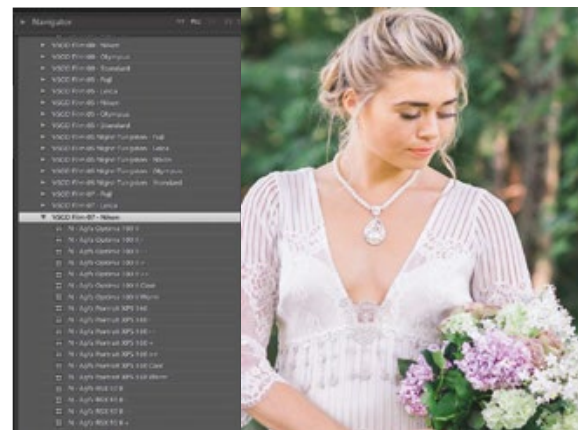
Why do some camera manufacturers have a 'film-simulation' mode on their digital cameras when people can take shots with an actual film camera?

I regularly use any old film camera I have to hand and put in a roll of film to create the look that you can't get with a digital camera. The results are then scanned to become digital images.

Not only does this look different to the sterile digital image, but it also ensures that commercial film labs have enough business to keep open.

As the saying goes, use them or lose them. **Andrew S Redding**

Your point is well made, but some film-emulation presets built into cameras and for Lightroom (particularly those



You can now get lots of film-emulation presets for Lightroom, some of which are excellent

from Mastin Labs and VSCO) are now very good indeed. Many people today want the 'look' of classic film, but with the convenience of digital, and film simulation is getting more and more realistic. Watch out for a major feature on film cameras and film photography soon. **Geoff Harris, deputy editor**



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Remember film

The AP of my distant youth has understandably 'gone digital' (and rather high-end at that), but I am pleased to see that you still take a sideways glance at film, such as the *Blast from the past* articles and the contributions from Roger Hicks. I, and I am sure others, still enjoy using film, in my case especially for black & white. Could you possibly do a bit more by including a regular, say monthly, feature for film users alongside your digital content? More coverage of the less expensive digital world would also be appreciated.

Ian Newton, Surrey

As we mentioned above in reply to Andrew Redding's letter, more on film is planned shortly – watch this space! **Geoff Harris, deputy editor**

Giving mobile users a chance

Will 2017 be the landmark year when pictures by mobile-phone users are given more visibility and create a defined presence? In sheer user numbers the balance is in their favour, as massive smartphone sales continue to edge out compacts at a high rate.

Perhaps the time has come when 'phonography' has earned its place alongside photography, for those who want to stick with their camera choices but probably carry a mobile as well. Pictures already published in AP show how results are creating a distinctive profile. Lars Rehm's *Viewpoint* article

(AP 14 January) on the recent improvements to smartphones is evidence of the steps in progress. And, quite rightly, he offers encouragement for us to give them a try.

A dual world of 'phonography' and photography could open up many new possibilities. **T John Foster, Stafford**



Is the 'phonography' revolution around the corner?

I think we are at this stage already – many pros now do a lot of work with smartphones, and some, such as Paul Hill MBE, use just an iPhone. You're right that smartphones continue to improve exponentially, and we will continue to feature the best images made with them – **Geoff Harris, deputy editor**

Snaps or art?

In *Reader Portfolio* (AP 7 January), you featured what I can only describe as 'snaps' by Steph Lord using an iPhone. I read the glowing assessments alongside each image and thought, 'Am I missing something?' There were no technical details and very little photographer background information. It's great to have your images published but, as someone who studied photography at art college, I felt the images were featured as a favour by someone who works for AP! **Alan Davies, Greater Manchester**

We stand by our decision to print Steph's images and we never feature photographers in AP as a 'favour'. As an experienced photographer, why not send in some of your images for possible inclusion in AP? – **Geoff Harris, deputy editor**

Who needs raw?

The letter *Who needs raw indeed?* (AP 21 January) refers to the debate between raw and JPEG images, but there is another format – TIFFs. These can be edited in most image editors from the past 30 years, and offer the 12 to 16-bit depth of a raw and are 'lossless' image files. The only limitation is that TIFFs are sometimes bigger than raw files. On the other hand, JPEGs offer huge amounts of compressibility, but are 'lossy'.

By all accounts, there is a 'lossless' version of the JPEG, but I've yet to encounter one. I also gather that the TIFF file format is now 'managed' by Adobe, but the company seems unwilling to refine this further.

So why isn't there also a raw vs TIFF debate going on?

Sam Chapman, Berkshire

Raw files record the data read off the camera's sensor, which means 12 bits or 14 bits of information for each light-sensitive pixel. On a Bayer sensor, each individual pixel only records one colour – red, green or blue – and responds linearly to light (doubling the light intensity doubles the signal recorded). The upshot is that raw files are not visually meaningful image files, and need to

be processed to make photographs. This is true even for raw files recorded in a TIFF-like format.

To convert a raw file to a photograph, colour needs to be interpolated at each pixel location to give an RGB image, white-balance correction applied, and a gamma conversion applied to match the logarithmic response of the human visual system. This is where most of the data is lost in raw conversion.

The processed image file is saved to the camera's memory, with JPEGs being better at compressing to small file sizes than TIFFs. While this technically discards image data, the low compression ratios used by camera manufacturers are visually lossless, meaning you can't distinguish a lightly compressed JPEG from an uncompressed, or losslessly compressed TIFF. Such JPEGs can also be edited and re-saved without any additional degradation, so long as you still save at a high-quality setting.

Overall, there's no practical disadvantage to using the smaller, faster JPEG format, unless you record 16-bit TIFFs, but these are huge – **Andy Westlake, technical editor**

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Working with ISO and noise

How do photographers manage with higher ISO settings and noise in their work? **Geoff Harris** considers some common issues, while **Oliver Atwell** discovers how two very different photographers deal with such conditions

By now you've hopefully got a good grounding in the finer points of ISO and noise. So how do photographers work with higher ISO settings in practice? Over the next few pages we'll hear from two photographers working in different genres: top music and portrait photographer John McMurtrie, and wildlife photographer (and Nikon ambassador) Richard Peters. But first, here's a quick overview of some of the issues to think about when you're wondering whether to use low, medium or high ISOs, or to switch to Auto ISO, and so on.

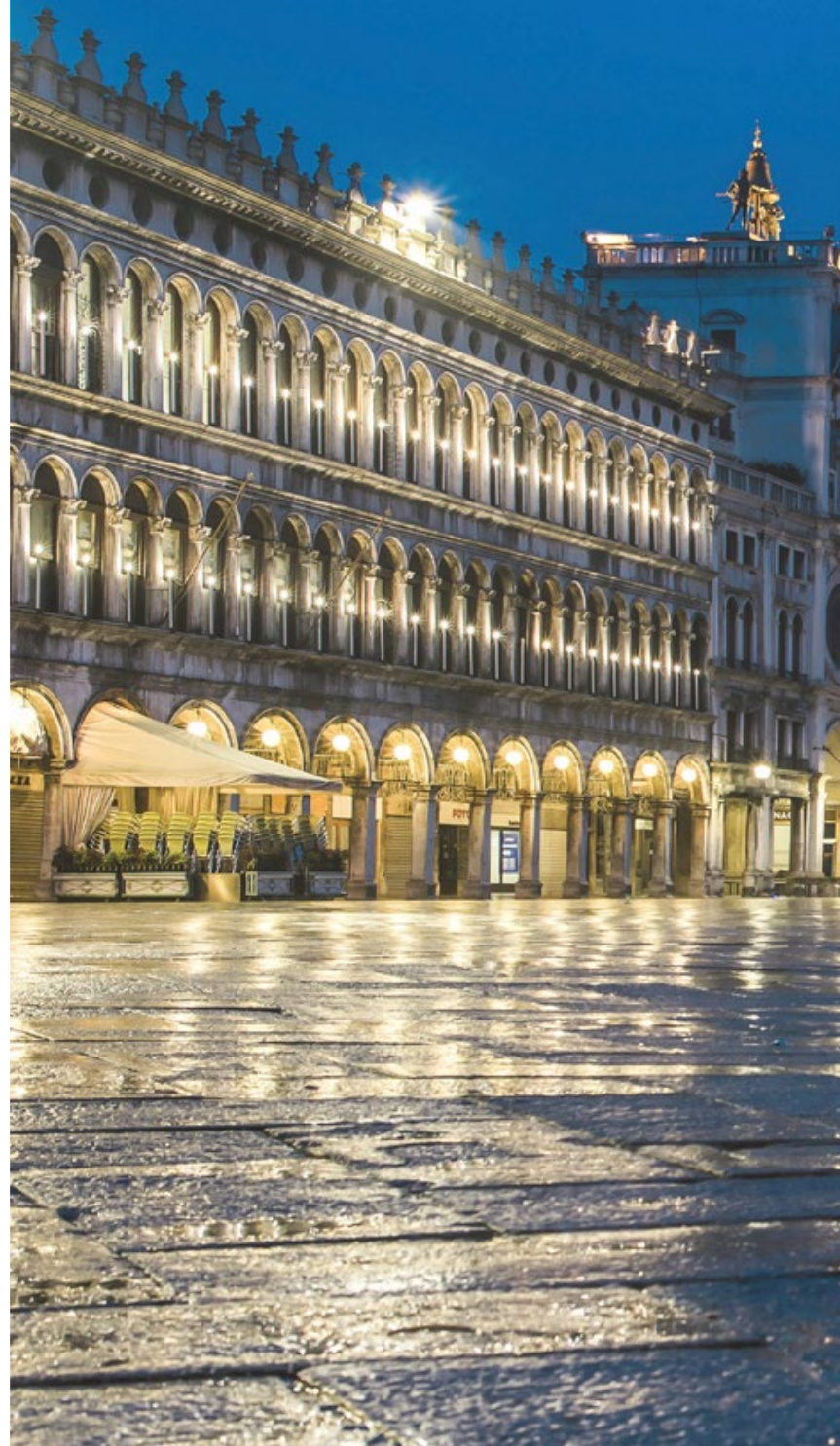
Long exposures and ISO

Early iterations of digital SLRs and higher-end compacts weren't always great at controlling noise or preserving image detail at relatively lowly ISO levels by today's standards, prompting photography magazines and other pundits to advise keeping the ISO as low as possible. However, times have changed, and even with modern entry-level SLRs costing a few hundred pounds, noise is rarely a headache up to ISO 1600 in decent light. There are times, however, when it still pays to keep the ISO as low as possible. Take long exposures, commonly used for dawn/dusk/night shots. It's still wise to keep the ISO down when shooting traffic trails or a city scene

at dusk, as you don't want to introduce noise for no good reason – you will often be selecting a slow shutter speed so the sensor is exposed to the available light for longer, and you should be using a tripod to keep everything sharp.

There are times, however, when you will need to use higher ISOs with long exposures in order to get any kind of usable image. So what to do then? With longer exposures, the camera's sensor gets warmer, so you may see tiny bright dots in your images as the pixels light up. It's very wise to make use of any long exposure noise-reduction feature on your camera, as these get rid of hot pixels. It makes a second identical exposure to the first with the shutter closed so the camera knows exactly where the hot pixels are and subtracts the dark frame image from the one just made. Just remember that the second 'blank' exposure has to be the same duration as the first, so if you make a five-minute exposure, you'll have to wait five more minutes for the image to pop up on the preview screen. Or if this seems too much hassle, you can just suck it up and remove the hot pixels later with software.

Don't increase the ISO in decent light just for the sake of it – when taking landscape shots, for example. If you are shooting a landscape as the sun rises, a tripod-mounted



Even at a low ISO it pays to turn on long-exposure noise reduction when you slow the shutter speed right down
Nikon D750, 28mm lens, 3 secs at f/9, ISO 125

camera lets you set long enough shutter speeds to capture a bright enough image, even in darker environments at low ISO values.

That said, there are occasions in landscape photography where you might want to use higher ISOs – when you need a higher shutter speed to capture movement, for example, when you want to keep some texture in a waterfall by shooting at a faster shutter speed, or simply when you don't want to lug your tripod around on an arduous hike. So the take-home message here is that yes, modern cameras are good at controlling noise, but don't get careless about higher ISOs and use them for the sake of it. There are enough things to think about when creating a great image, without the hassle of removing unnecessary noise.

Auto or manual ISO?

This is another interesting practical question – should you set the ISO yourself before starting a shoot, or make use of your camera's Auto ISO function? There is a lot of snobbery among keen photographers about relying on 'auto' anything, but they



could be missing a trick. By selecting Auto ISO and shooting in Manual mode you are still able to exert the highest degree of control of your aperture and shutter speed, while recognising that the clever electronics inside modern cameras can do a great job of dealing with ISO. Auto ISO won't get the ISO selection exactly right every time, but a lot of the time it does – and you can say the same about semi-automatic shooting modes, such as Aperture or Shutter Priority.

Greater ISO flexibility also enables greater shutter-speed flexibility, remember, and if you are worried about noise, it is usually possible to set the upper level of Auto ISO – say 3200 – or 1600 if you are more cautious. Set this upper level according to the available light and your lens, and how well your camera copes with noise at higher ISO levels. Auto ISO is not a magic bullet for every situation, but it can come in very handy when you are taking a lot of images under time pressure and changing light (for example, at a wedding) and sharpness is paramount. Why not give it a try?

When shooting a wedding, flash is not always allowed. So high ISOs, combined with fast lenses, are essential for getting those shots of crucial moments

Nikon D810, 24-70mm lens, 1/125 sec at f/2.8, ISO 2000



Horses for courses

Don't get obsessed about noise and blow it out of proportion. It's very easy to become a 'pixel peeper' and view all your images at 100% in Lightroom or Photoshop, which can often reveal what appears to be painful levels of noise – especially if you shot in poor light and had to fix

underexposure, or used a higher ISO setting. But if you then print out the image at A4, this same 'catastrophic' level of noise might be barely noticeable, even to the most fastidious eye. Be mindful of noise and how to remove its worst excesses, but better a noisy shot than a soft one...



Music

Music photographer **John McMurtrie** discusses how he's able to shoot gigs in low-light conditions

What kind of preparation do you do for a typical live shoot?

I normally get to the venue around 4pm, although that can sometimes be as early as midday if I'm setting up remote cameras for the shoot. Once in the venue, I set up a secure production office backstage for my computer and camera equipment. If I'm setting up remote cameras within the lighting rig, I have to be at the venue while all the trusses are down.

I put all batteries on charge, format cards and clean the sensors. I then connect to the Wi-Fi and start my computer, uploading any

outstanding shots. I then grab a camera and scope out the venue. While on tour, the stage set remains the same, but depending on venue sizes, the distance between the stage set and backdrops can vary widely.

I chat with the lighting designer about follow spots. I then check out the pit, the barrier and the stage (looking out for holes in the stage as well as potential danger areas and trip hazards). When the lights go out and the show starts, everything looks very different.

Lastly, I find an easy route to the top and back of the arena to get the huge arena/stadium shots. Doing it before the show starts prevents me getting lost during the show (which has happened!). I then shoot a few shots of the stage production before the show begins and head outside to photograph the venue and the usual line of fans queuing around the block. Depending on the country, you have to have your wits about you as some fans get more excited than others.

By 7pm I have dinner and prepare all cameras for the show. By 8pm

the band are usually close to being ready, wearing stage clothes, and this is when we will usually shoot any press portraits needed for that territory. I also pack up all equipment ready to grab and go.

I'll then photograph the 'walk-up' of the band to the stage. I usually get some of the best character shots of the band here as there's a buzz of excitement in the air. This is always low light, so I shoot at a high ISO at f/2.8 with a shutter speed of around 1/500sec. Once the band is on stage, I put my ear plugs firmly in and make my way to the pit at the front of the stage. Never forget a torch – it's a difficult journey without, avoiding ramps and cables. Five minutes later and the band hit the stage and my real job begins for the next two hours.

What camera do you currently use and how does it cope with low-light conditions?

Nikon. If you're shooting low light, then you can only use Nikon. I've tested the Canon system and the low light is not a patch on the Nikon's. The game changer was the launch of the Nikon D3. When that camera was launched it blew my mind, and digital photography made a huge technological leap, making it better than film. I'm currently using the D4s with a D5 on order. A lot of people in the photography world will tell you that more pixels equals better low-light capabilities. I find the opposite is true. The higher the pixel count the lower the quality in low light at high ISO. The D4s is 16 million pixels and the quality at ISO 3200 is outstanding. At ISO 3200 on a 22-million-pixel camera the images are poor without noise reduction.

How far do you dare to crank up the ISO in these conditions?

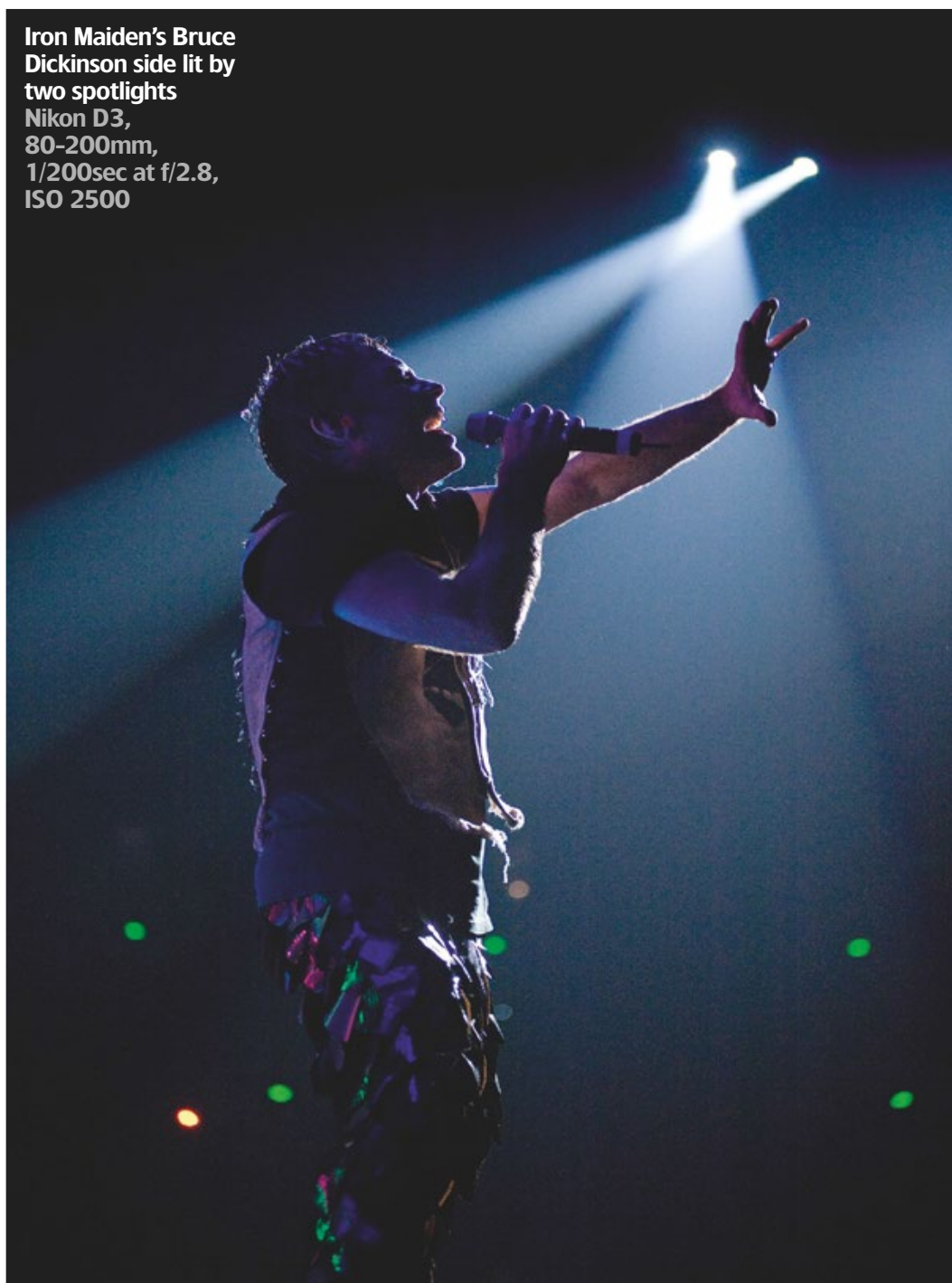
On a D4s I shoot at ISO 1000-2000 as standard. If the light levels fall low, then I'll occasionally shoot at ISO 3200 and if desperate I shoot at ISO 5000, but then use the noise-reduction function in Lightroom.

In seriously dark conditions I use my Zeiss Otus f/1.4 lens. This is an outstanding lens for sharpness and is a wonderful portrait lens.

Is it difficult to shoot scenes in such low light when the band is constantly moving?

Definitely. I only ever use manual exposure, choosing to change shutter speeds with a flick of my thumb, rather than relying on an

Iron Maiden's Bruce Dickinson side lit by two spotlights
Nikon D3,
80-200mm,
1/200sec at f/2.8,
ISO 2500



Far right middle:
Iron Maiden guitarist
Janick Gers live
onstage in Brisbane,
Australia
Nikon D3,
24-70mm, 1/400sec
at f/3.2, ISO 2500

Far right below:
McMurtrie turns his
attention on the
rapturous crowds
Nikon D3S,
24-70mm, 1/200sec
at f/2.8, ISO 2000



John McMurtrie is an award-winning music photographer. He is also the official photographer for Iron Maiden and his images have featured in many global publications. See more at www.picturedesk.co.uk



Iron Maiden onstage in Mexico City
Nikon D4S, 28-70mm,
1/1600sec at f/4, ISO 2000

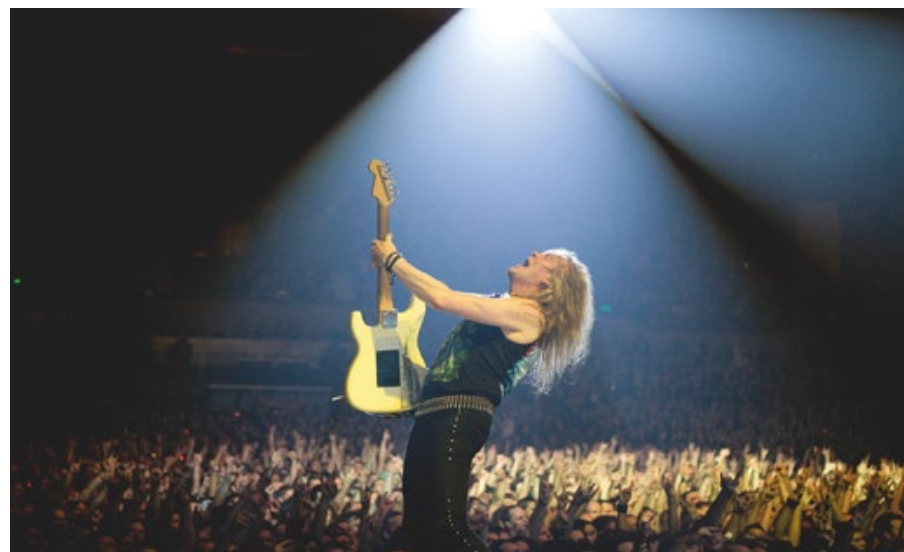
auto exposure mode, which half the time will underexpose due to the bright stage lights. To catch Bruce Dickinson [singer in Iron Maiden] flying through the air on stage and to keep him sharp, I need a shutter speed of at least 1/800sec. To do that, I need a fast ISO of 2000. I usually prefocus and wait for Bruce to jump and rattle off about 20 shots in a two-second burst. This method allows me to take one optimum frame.

Shooting Nicko McBrain, the drummer, is difficult because he doesn't have the luxury of a follow spot. To get shots of him, I have to crawl through the back of the stage set and into the drum area, which is cramped and narrow. Once past the drum tech, I then can only ever shoot on a 16mm fisheye, as I'm incredibly close to Nicko hitting his kit. I then have to focus and wait for the light to be right before shooting. Auto exposure never works here because of the reflections on the cymbals – it will always underexpose. I also need to keep the shutter above 1/250sec or there's too much motion blur. Guitarists are usually straightforward but during solos the

facial expressions are not always flattering. Iron Maiden use a lot of pyrotechnics and to expose for flames and explosions I'm sometimes shooting shutter speeds over 1/1,000sec. I also have to be in the right position before they fire, and somewhere safe.

At the end of the show, I have literally 30 seconds on the back walkway to get the band and crowd all lit up before a massive amount of pyros fire beneath my feet. I have to have eye contact with the pyro technician or this potentially could be life threatening if I get my timing wrong. I get the shot and quickly turn and walk down the steps off the stage. Usually I'll feel the warmth of the explosion on the back of my neck just as I turn.

The biggest difficulties music photographers have these days are colour balance and oversaturation from the widely used LED lighting. Most follow spots are a warm tungsten colour, while the stage LED lights are a daylight blue. It is beyond the physics of photography to successfully balance the two perfectly so there is a lot more post-production getting colours to balance.



Wildlife

Nikon Ambassador and wildlife photographer **Richard Peters** explains how he deals with low-light conditions

Under what circumstances do you find yourself working in low-light conditions? It's something that's particularly prevalent in your book *Back Garden Safari*.

My need for low-light shooting depends on whether I am working with a camera trap or find myself at the mercy of the weather during daylight hours. Camera-trap work, for example, often requires taking photos when there is virtually no ambient light in order to capture photos of animals that are very active at night.

At the other end of the scale, shooting in heavily overcast daylight, especially at sunrise or sunset, or even in average light but when a high shutter speed is required, can introduce challenges that need to be compensated with aperture, shutter and ISO variations. The desired end result will dictate which approach I take, but one thing I always keep in mind is that low light doesn't have to mean it's automatically time to pack away the camera.

How do you tackle the issue of focusing in low light? Is it trickier to use autofocus in such circumstances?

Of course the degree of what is considered low light can vary, but one thing is a given – this type of light reduces contrast and, because autofocus systems rely on contrast to work, this can trip your DSLR up and cause the focus to hunt. This is not too much of a concern with camera trapping because you would prefocus the camera and then set it to manual so it doesn't change.


However, when shooting in low daylight, I often use the more sensitive single point focus sensors rather than group modes. Another trick I like to deploy if

I'm using a teleconverter, which also reduces the focus sensitivity even more, is to prefocus manually on the subject before engaging the autofocus. This manual assistance can often be just enough to help the camera acquire focus lock.

Exploring the low-light capabilities of the Nikon D5
Nikon D5, 400mm, 1/1250sec at f/8, ISO 28,800

Which camera are you using at the moment that is able to deal with such lighting conditions? DSLRs are getting better all the time at working in less-than-ideal conditions, but currently my main camera bodies are two Nikon D810s, which have very good






Despite the low-light conditions, Richard has captured this wildcat in mid-air with not a hint of blur
Nikon D5, 200-500mm, 1/4000sec at f/6.3, ISO 11,400

low-light autofocus capabilities, plus a recently added Nikon D500 that has some of the best autofocus capabilities of any camera on the market. I've used a D5 and while it's a phenomenal bit of kit, my style of shooting finds the detachable gripped bodies more flexible, especially when using as a camera trap. I often need to have as small and quiet a camera as possible in those situations. The focus sensitivity of all three of my cameras also means focus remains more accurate when teleconverters are added to my 400mm lens. In the case of the D500, it retains very sensitive cross-type focus points right at the edge of the frame, which can help aid composition in low contrast.

In these conditions, it's likely that you'll use fairly high ISOs. Is this a problem in terms of noise or dynamic range?

It's actually quite incredible just how good sensor technology has become in recent years. Even entry-level DSLRs have native ISO ranges that can go into five figures but despite this, I still always strive to keep the ISO as low as possible. On a D5, I've used ISO 30,000+ and seen incredible results in the right conditions. But as a general rule of thumb, regardless of the camera I'm using, I try to



A fox stalks during dusk
Nikon D810, 18-35mm, 1/125sec at f/8, ISO 640, 2x Nikon speedlights

limit my ISO to one or two stops below its native maximum.

Image-editing software such as Lightroom has helped considerably, though, as alongside improvements in sensor quality, noise reduction is getting better and better, too, so we're definitely a lot more spoilt now than ever before with regards to being able to shoot in darker environments.

The bigger issue to consider is the drop-off in dynamic range and image sharpness. As the ISO levels creep up, both of those aspects deteriorate. This can make it harder to recover and retain details in deep shadows, so there's always a trade-off, even with technology as good as it is today. The important thing is to learn the limitations of the camera and try to work within those boundaries, but equally don't be afraid to push them whenever needed. You also lose a couple of stops of noise when printing, so I tend not to get too worried about how a high-ISO

image looks when viewed at 100% on my computer screen. Instead, I concentrate more on making sure the content of the photo is as appealing as possible.

What about flash? Is this something you tend to use?

Introducing off-camera flash is a very good way to make working in low light a more favourable experience. Care should always be taken when working with flashguns and wildlife by using aperture and ISO to adjust the DSLR's sensitivity to light rather than using the flash at full power. By mastering this technique and having more control over the light sources in your image, you can really help your photos 'pop'. Using off-camera flash in low daylight enables you to emphasise that low ambient light and use flash to keep the subject illuminated or, at night, it can allow you to freeze the motion of your subject, even during exposures of 30 seconds.



As well as being a Nikon Ambassador, Richard Peters' work has also been recognised twice in the Wildlife Photographer of the Year as well as seeing him named the European Wildlife Photographer of the Year 2015. Richard runs workshops at home and abroad as well having written his own eBook, *Back Garden Safari*. www.richardpeters.co.uk



Noise reduction software

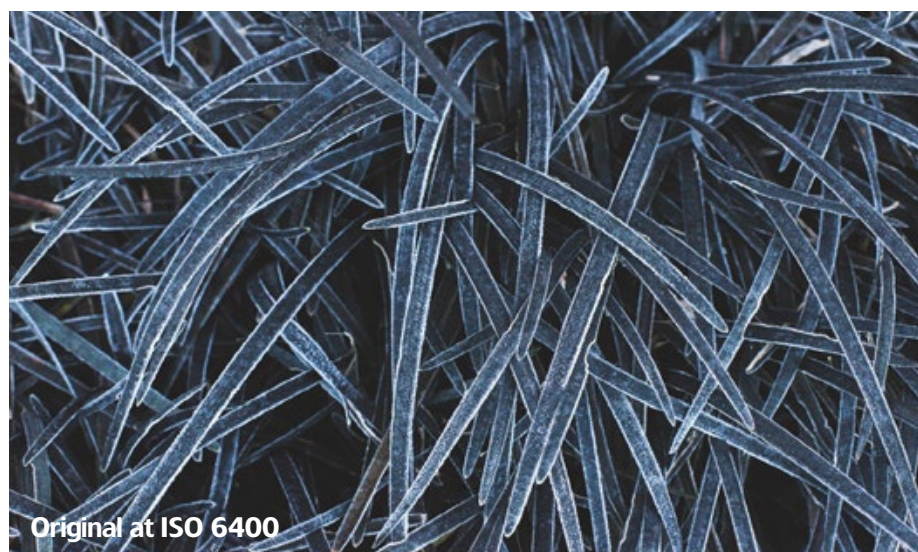
You can enjoy low-noise images when shooting at high ISO settings by using noise-reduction software.

James Abbott looks at five options

Modern cameras are excellent performers when it comes to high ISO sensitivities, and it's common to be able to shoot as high as ISO 1600 without noise being a problem. These days, ISO 1600 is roughly equivalent to ISO 400, in terms of

noise, in cameras from ten years ago, so for most images you can often get away with not needing to use noise reduction. However, there are times when the ISO you need is so high that noise is inevitable.

The most common reason for needing high ISO settings is to enable you get usable shots in low

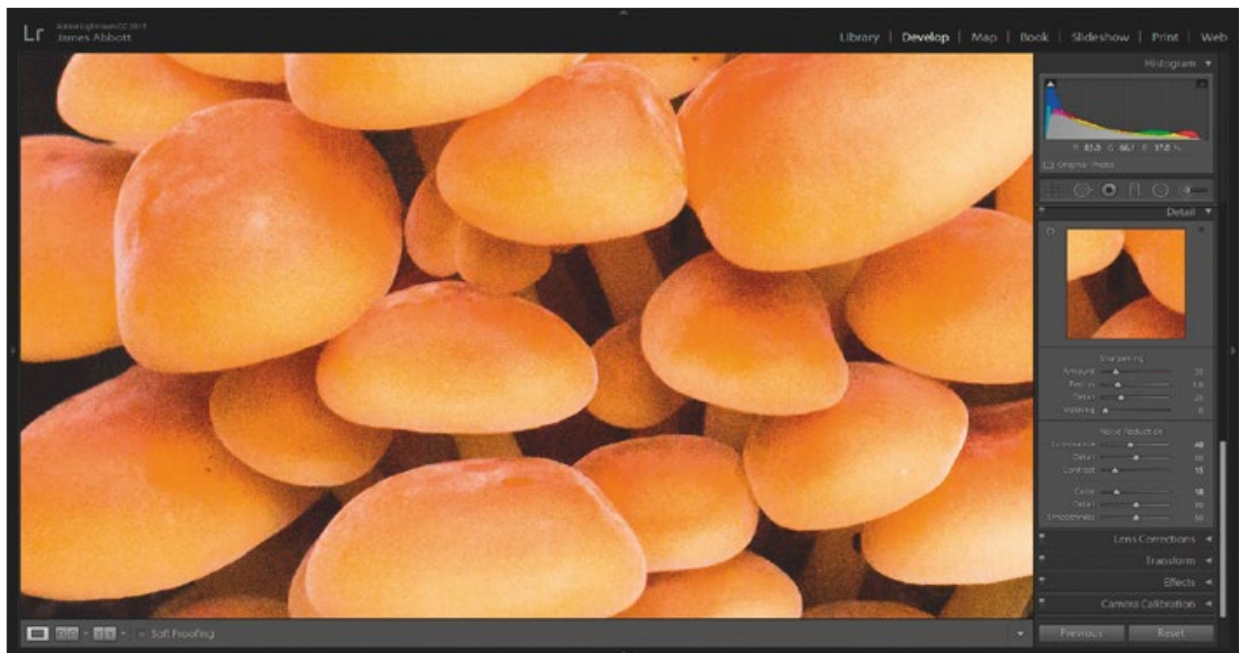


light by keeping the shutter speed fast enough to avoid camera shake. You also need high ISOs when shooting sports – where the shutter speed needs not to only support the focal length of the lens and avoid camera shake, but also to freeze the action.

In these cases it can be common to shoot as high as ISO 25,600, and it's at these settings where noise-reduction software can drastically reduce the amount of noise in your shots. The two main types of noise are colour/chroma and luminance. Colour

noise appears as coloured specks and patches, while luminance noise has a grain-like appearance similar to film grain, although more uniform in size and shape.

Noise-reduction software is the best way to combat these negative side effects, and there are a number of options out there ranging from free software, noise-reduction features within editing software such as Photoshop to dedicated programs whose sole function is to reduce high ISO noise. Here we take a look at five options to consider.



Lightroom/ACR

● Creative Cloud Photography Plan £102 per year ● www.adobe.com/uk

ADOBE Camera Raw (ACR) is the part of Photoshop used for processing raw files. The same image-processing engine is used in Lightroom, so the two offer identical features. The Noise Reduction controls sit within the Detail tab, and applying noise reduction is manual with no presets or intelligent auto settings on offer. By default, Color is set to 25, which is often more than adequate for even the highest ISO settings. For most images the Color

slider is the only one you need to use to reduce colour noise, but the Detail and Smoothness sliders offer additional control. Luminance, which sits above Color, has the main slider set to 0 by default, and needs to be applied sparingly to avoid 'waxy-looking' detail. The Detail and Contrast sliders allow you to refine the appearance of the luminance noise reduction. The overall quality of noise reduction using Lightroom and ACR is excellent, and for most photographers shooting raw it's the ideal choice. Lightroom did a great job of reducing both types of noise in our test images covering ISO 1600, 6400 and 25,600. Even at the highest ISO



Lightroom's noise-reduction controls effectively reduced the noise in our test images

setting it was possible to drastically reduce noise without losing too much detail or creating waxy tones. For those shooting JPEGs, the Camera Raw Filter in Photoshop gives you access to ACR controls including noise reduction.



Google Nik Collection Dfine 2

● Free ● www.google.com/nikcollection

DFINE 2 comes with six plug-ins that work seamlessly with Photoshop, Lightroom and the now-defunct Aperture, so you will need one or more of these programs to use Dfine 2. The best way to use the software is to convert raw files to 16-bit TIFFs in Photoshop or Lightroom, and then open them in Dfine. The software interface is clear and simple, and

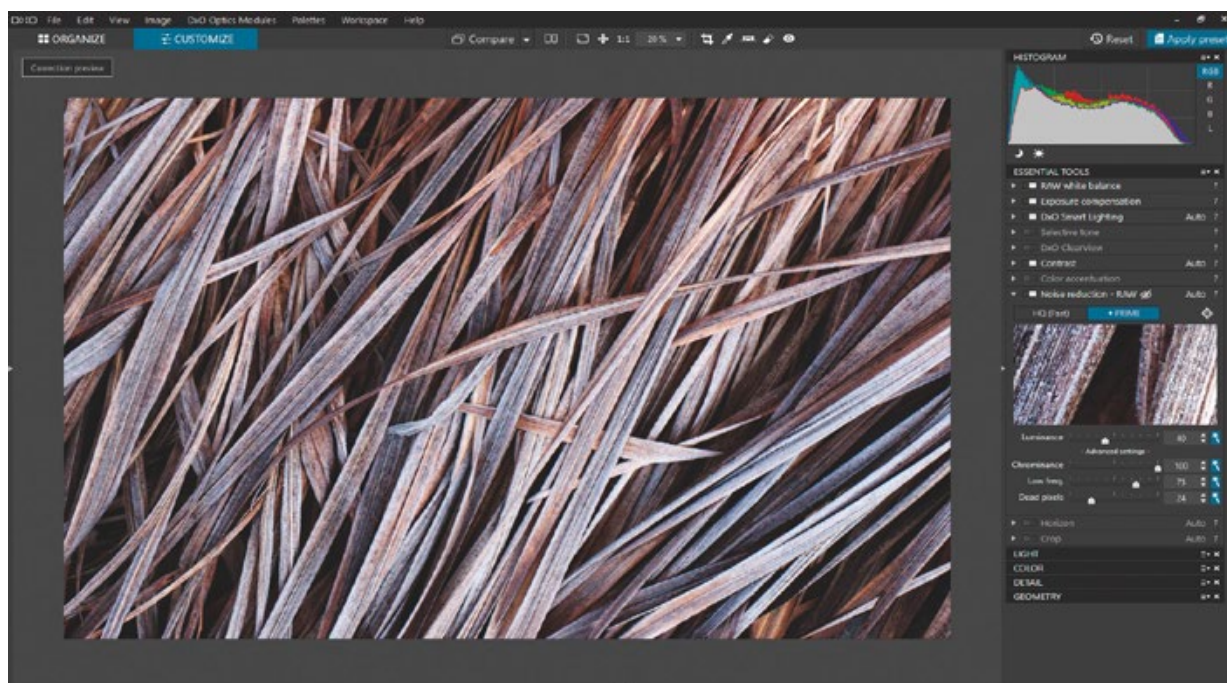
when the image initially opens it's analysed with Method set to Automatic. You can use this or select Manual to choose several points manually within the image, but Automatic saves time. At this point you click on the Reduce tab and have two options: Points and Colour Ranges. Points provides an easy way of reducing noise and the ability to place localised control points. The Colour Ranges option breaks the image down into three channels and offers the ability to control contrast noise (luminance) and colour noise independently.



Dfine 2's results were good, but the disadvantage is that you work on a TIFF rather than a raw file

The main problem is that you're working on a TIFF rather than a raw file, and you will nearly always achieve better results using raw. Results were impressive, though, and the plug-in suite is worth looking into if only for HDR Efex Pro and Silver Efex Pro.





DxO OpticsPro 11 Elite

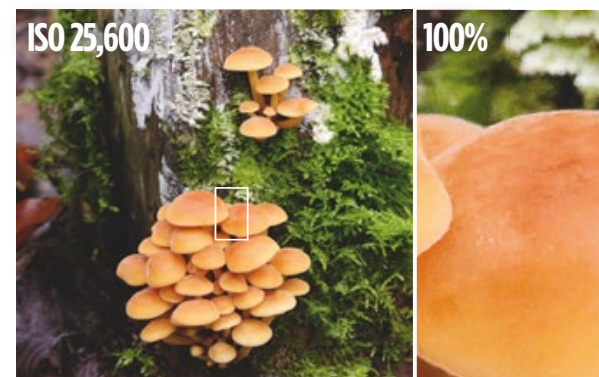
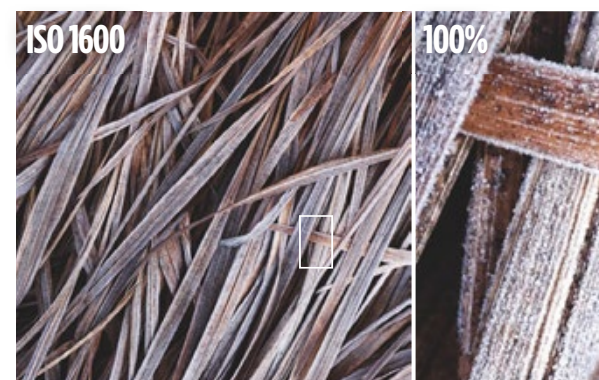
£159 • www.dxo.com

DXO OPTICSPRO 11 Elite offers all the controls you'd expect in a raw converter, plus unrivalled lens correction and highly regarded noise-reduction capabilities. This software does most of what you need and offers seamless integration with Lightroom. Make all your adjustments in Lightroom, export a DNG to OpticsPro for lens correction, sharpening and noise reduction, and then back into Lightroom.

OpticsPro uses DxO PRIME technology to

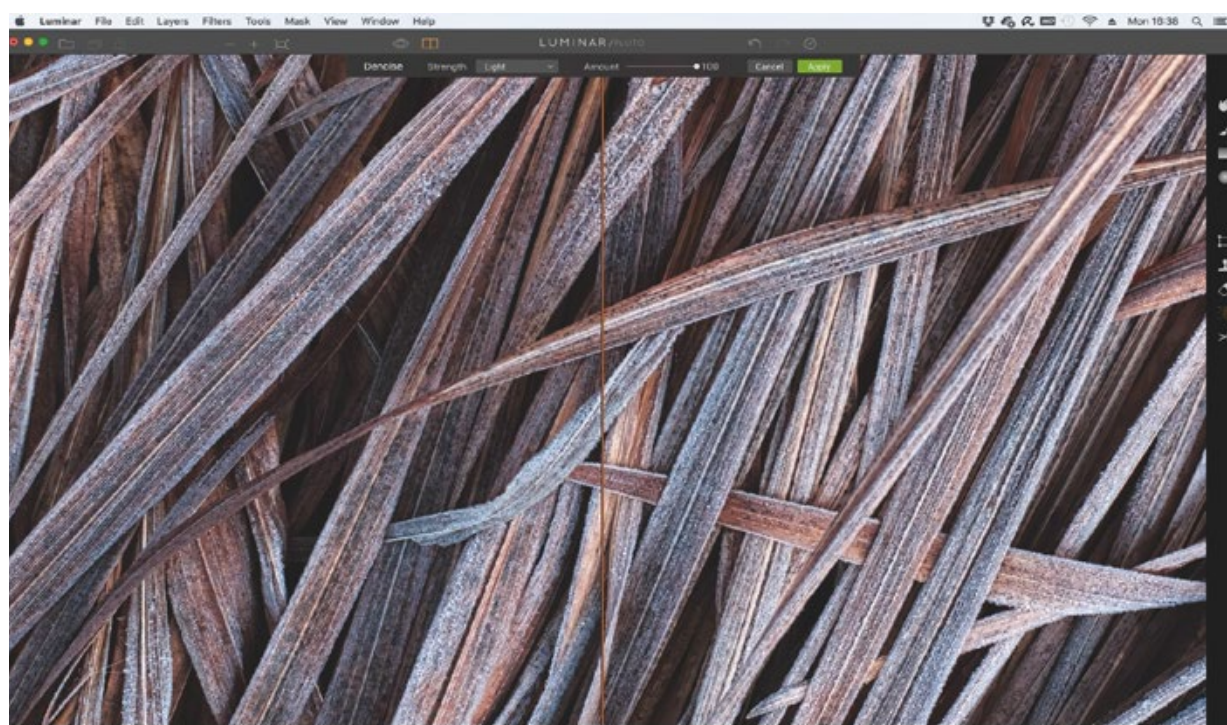
analyse raw files to differentiate between noise and fine details. Using just the intelligent automatic noise-reduction feature produced the best results in our test, but there are four simple sliders that can also be used.

First, choose between the HQ (Fast) and PRIME algorithms, with the former being faster and the latter providing slower processing time but improved noise reduction. With a high ISO shot PRIME is the logical choice. If you prefer to use manual, you can use the sliders to reduce luminance and colour noise, plus coarse noise and colour blotches. There's also a



slider to reduce dead and hot pixels.

The noise reduction achievable by OpticsPro 11 Elite is the best in class. The main downside is that if you use Lightroom it requires an extra purchase. However, the licence is a one-off fee, and OpticsPro works standalone or will integrate into Lightroom's workflow.



MacPhun Luminar

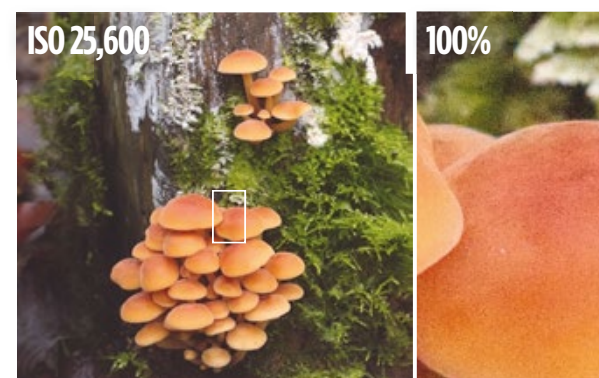
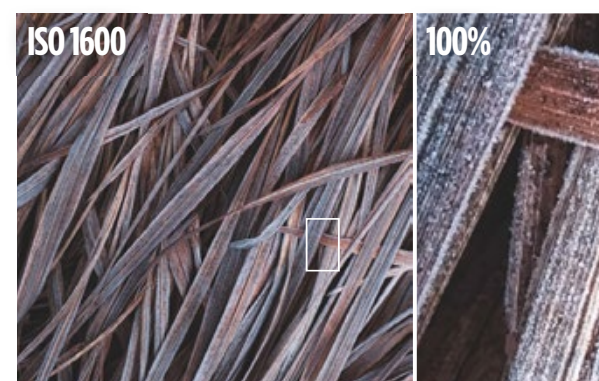
£44 • www.macphun.com/luminar

MACPHUN Luminar is an image-editing program for all levels of photographer. In a photography world dominated by Adobe products, MacPhun is making waves with its primarily Mac-based software. At present Luminar is only available for Apple computers, but future software is expected for PCs.

Luminar works as standalone software and as a plug-in for Photoshop, and supports

various image file types including raw. One of its innovative features is that you can adapt the interface to suit your needs and ability, by turning the visibility of tools and features off or on. Noise reduction is accessed via the main menu rather than a tool bar, but is easy to find.

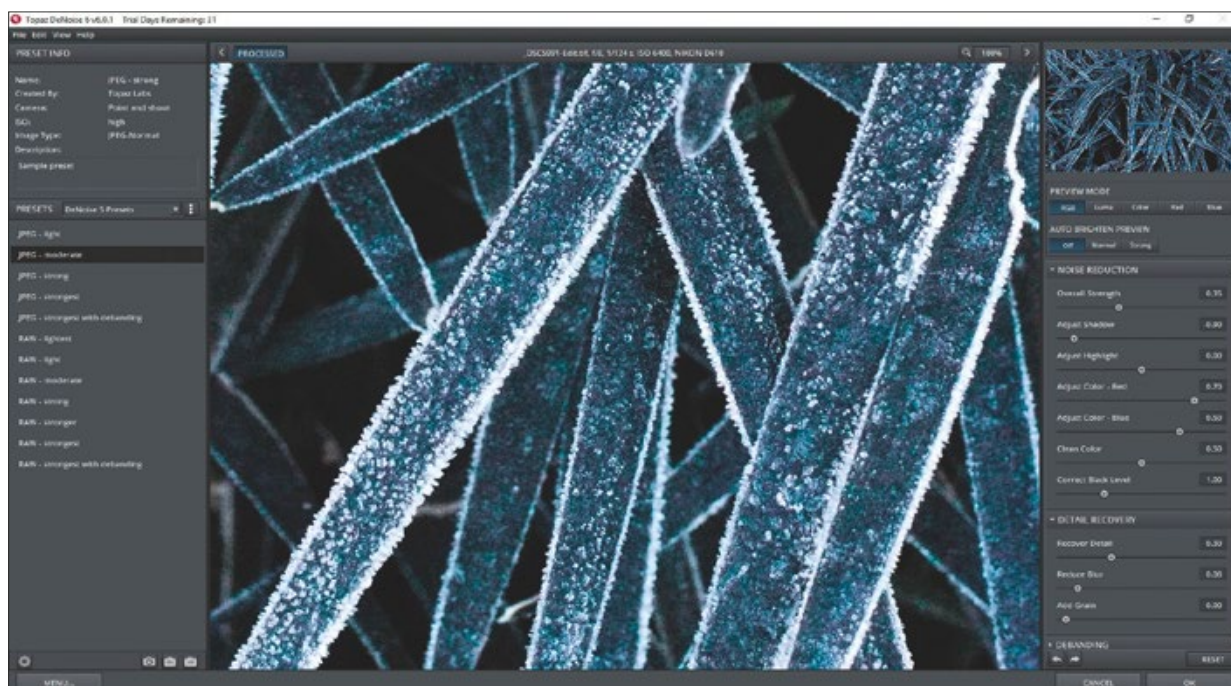
The software is a pleasure to use thanks to its simplicity and powerful controls. The noise-reduction controls were the easiest to use in the test by far, and despite their simplicity the results were very good. The results were in the same league as Lightroom,



which makes this software a very attractive proposition for the price for Mac users.

At the time of writing Luminar is available for £44 (RRP £52). Like DxO OpticsPro 11 Elite, Luminar is a great piece of software with unique features, but neither includes the image-cataloguing capabilities of Lightroom.





Topaz DeNoise

- \$79.99
- www.topazlabs.com/denoise

TOPAZ DeNoise is designed just to reduce noise, although Topaz does produce a range of photography software solutions. Just like Dfine 2, DeNoise integrates with both Photoshop and Lightroom, but also covers Corel PaintShop Pro and Photo Plus (although Photo Plus is no longer supported by Serif, despite being available to purchase). DeNoise uses image data to remove noise and recover detail, with controls to handle colour and luminosity noise alongside problems such as debanding, shadow-tone restoration and colour casts.

DeNoise offers the most controls of all the software in this test, and will appeal to those who like to fine-tune noise reduction. However,

the process is more time-consuming than the other options despite being able to use existing presets and those you create yourself. These include presets for a limited number of cameras at specific ISO settings, plus a selection for JPEG and raw.

The software works with JPEGs or TIFFs, and for best results you should convert raw files to 16-bit TIFFs. DeNoise did a good job of our ISO 1600 and 6400 test images, but at ISO 25,600 it started to fall behind the others. While the image looked good at fit to screen, when zoomed in to 100% there was strong luminance noise visible, especially in the shadows.

At \$79 Topaz DeNoise isn't expensive, but Nik Dfine is free and offers better results.



Our verdict

NOISE-REDUCTION software remains an important consideration for photographers, despite the incredible capabilities of modern cameras. The main considerations are whether or not you want to add another step to your workflow, change processing software or is it important for you to work with raw files rather than 16-bit TIFFs? The answer will be different for everyone, but there are certainly some interesting options on the table.

Topaz DeNoise offers a lot of control over each element of noise reduction, all within software that works standalone or integrates with several other editing programs, most notable perhaps being PaintShop Pro, which isn't often supported by plug-ins. Unfortunately, the overall process using DeNoise was slower than the other software, and the results not as good with higher ISO images.

Considering Google Nik Dfine 2 works with 16-bit TIFFs (or JPEGs), the plug-in did a very good job of reducing noise in our test images. It wasn't too far behind Adobe Camera Raw, although this point alone makes its use questionable because of the extra step it would introduce into your Adobe-based workflow. That said, it is free and sits within a suite of highly regarded plug-ins.

Excellent image-editing packages

Adobe may have a monopoly on editing software, but that hasn't put MacPhun off from producing some excellent image-editing software packages including Luminar. The software is simple and intuitive to use, and the noise-reduction element was the easiest of all the software in the test. While the test images could have been pushed harder with higher settings without creating a waxy look, the overall results were similar to Adobe Camera Raw. Unfortunately, Luminar is currently only compatible with Apple computers.

Lightroom is the king of image cataloguing, and alongside powerful controls it's a strong option for photographers. Noise reduction is impressive, and if you want to keep your workflow simple with fast and easy-to-use noise reduction controls, then look no further.

If you really want the best noise reduction you can buy, whether you're looking for full automation or manual control, then DxO OpticsPro 11 Elite is the option for you. This powerful raw-processing software produces excellent results, and works standalone or integrates with Lightroom for the most powerful combination of all. To achieve the finest results you'll want to select the PRIME algorithm ahead of the HQ (fast) option, however you'll need to be prepared for this to eat into your workflow. It slows down the speed of turning around large batches of images considerably.

It might not have the image cataloguing of Lightroom, but if you're after ultimate noise reduction control, DxO Optics Pro gets the nod.

Reader Portfolio

Spotlight on readers' excellent images and how they captured them



Paul Crowley, Hertford



Paul first started exploring photography seriously as an art student where he developed his own film and prints. He enjoyed the quality of the medium and soon found he was hooked for life.

His favourite subjects to shoot are people and the urban environment, subjects that are obviously particularly prevalent in the field of street photography. In the future he hopes to travel to places such as Naples that will offer something new for his photographic portfolio. Visit www.demographik.co.uk.

King's Cross

1 The driver of the scooter creates a great foreground subject that leads us through into the busy King's Cross scene beyond
Ricoh GR Mark 1, 18.3mm, 1/400sec at f/3.5, ISO 400

Homeless

2 Here Paul has taken an opportunity to shoot from the hip and in doing so has come across a scene familiar to every city dweller
Ricoh GR Mark 1, 18.3mm, 1/600sec at f/4, ISO 400



Islington

3 What at first seems to be a visually busy scene is actually a simple study of the repetition of shapes and lines that can be found in a lot of street photography
Ricoh GR Mark 1, 18.3mm, 1/800sec at f/4, ISO 400





Manfrotto The Reader Portfolio

winner chosen every week will receive a **Manfrotto PIXI EVO tripod** worth £44.95. Visit www.manfrotto.co.uk

Lightweight and portable, the Manfrotto PIXI EVO boasts two different leg angles with a sliding selector enabling you to shoot ground-level images. It's adjustable, with two-section legs featuring five different steps that adapt the footprint to uneven surfaces. With a payload of 2.5kg, you can tilt the camera 90° to capture incredible images.



YOUR PICTURES IN PRINT

Submit your images

Please see the 'Send us your pictures' section on page 3 for details or visit www.amateurphotographer.co.uk/portfolio



White Rabbit

4 Paul has found a strange scene in this image taken in Islington, London. The white rabbit looks as if it could be in exile from a Lewis Carroll novel
Richo GR Mark 1, 18.3mm, 1/640sec at f/3.2, ISO 400

Holloway Road

5 Again we see the benefit of keeping your eyes peeled as a street photographer. Paul spotted this scene while walking past a pub in the Holloway Road
Richo GR Mark 1, 18.3mm, 1/1000sec at f/3.5, ISO 4000



Evening Class

Photoshop guru **Martin Evening** sorts out your photo-editing and post-processing problems

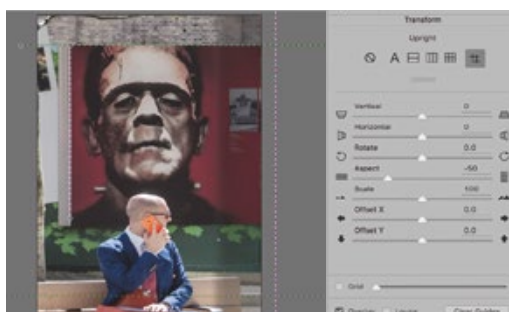
How to adjust the composition

Street photography is all about finding angles that allow for an interesting composition. Allan Hart's photograph is a good example. The main feature is the man on his phone, overshadowed by a Boris Karloff poster. Ideally, it should have been captured with a tighter crop applied

in-camera. But I notice it was shot using a 105mm focal length lens on a Nikon D90, so the only option would have been to get closer. The following steps show how a Guided Upright adjustment plus a tight crop in Camera Raw gives a cleaner composition.

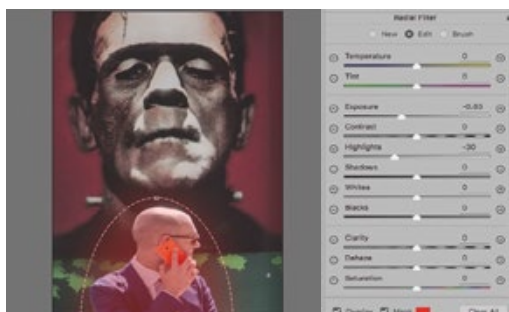
Submit your images

Please see the 'Send us your pictures' section on page 3 for details or visit www.amateurphotographer.co.uk



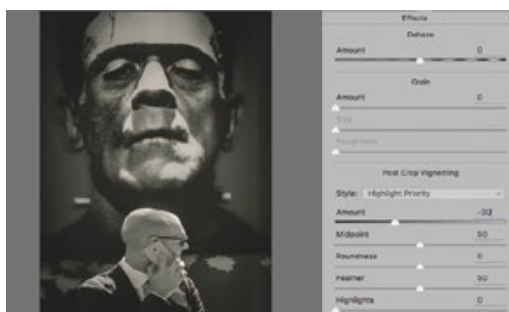
1 Apply Guided Upright adjustments

In the Basic panel, I used the Auto button to apply an auto tone adjustment. I selected the Crop tool to crop the image. I used the Transform tool and selected the Guided Upright option and added the guides to correct the perspective and aspect ratio.



2 Add Radial Filter adjustments

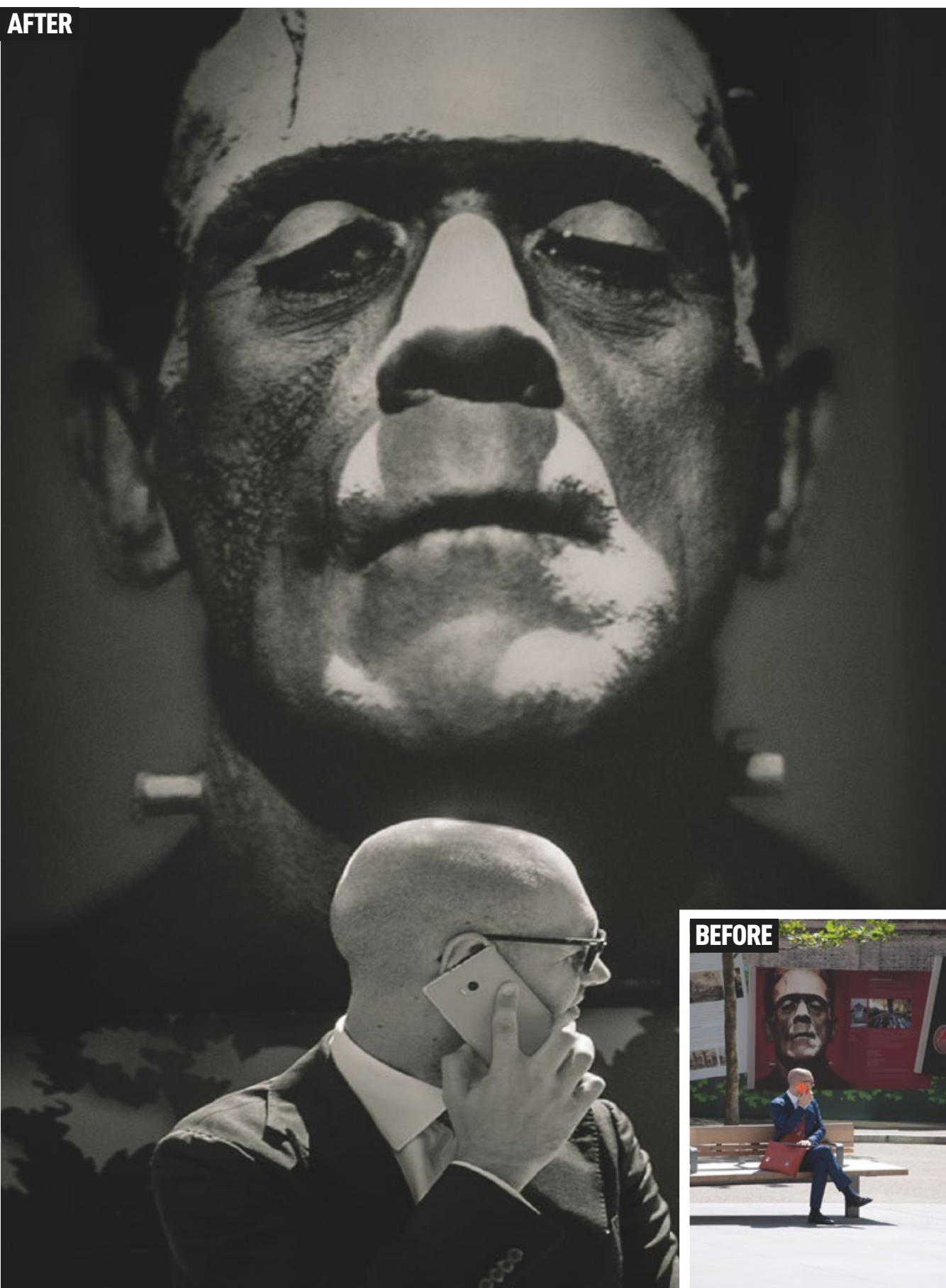
I reselected the Crop tool and cropped the image more tightly. I applied a Radial Filter to the bottom that darkened the Exposure in the outer areas and reduced the Highlights. This balanced the tones between the poster and the man.



3 Convert to black & white

I then went to the HSL/Grayscale panel, and clicked 'Convert to Grayscale' to apply a custom black & white conversion. To this I added a sepia Split Toning effect. Finally, I went to the Effects panel and added a darkening post crop vignette.

AFTER

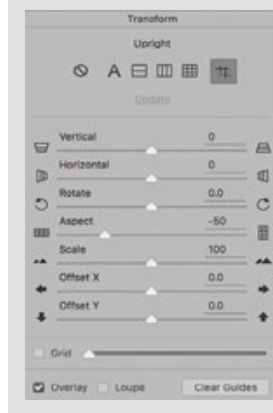


BEFORE



How to add contrast

ALEC Connah's image shows a group of kids having fun playing up to the camera. He probably had to work quickly and it helped that the camera was set to auto – in situations like this you need all the help you can get. The only minor thing wrong is that the feet are cropped. It would have helped if the camera had been pointed down slightly, or maybe Alec had stepped back.



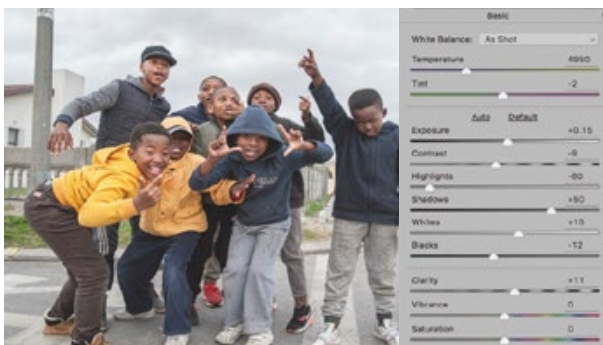
Aspect Ratio corrections

ALLAN Hart's photograph (left) needed careful cropping to achieve a simpler composition. When I first corrected the perspective using a Guided Upright transformation, the image ended up stretched. The solution was to combine the Upright transformation with an Aspect Ratio adjustment. I set the slider to -50 which stretched the image horizontally and compressed it vertically. In the final cropped image the original 2:3 aspect ratio was preserved. The -50 adjustment was about as far as I could go – any further and the man's face would appear stretched.

AFTER



BEFORE



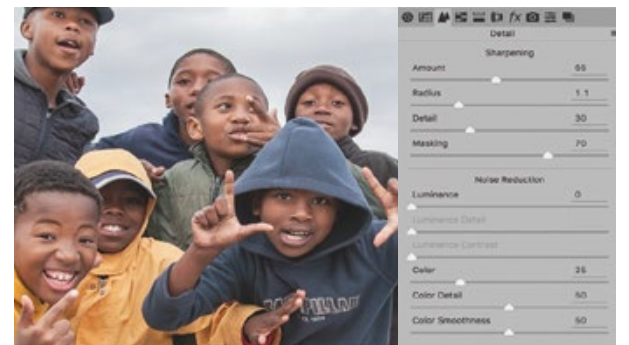
1 Apply Basic panel tone adjustments

The original raw photograph was a little dark and contrasty. The first step was to edit the image using the Basic panel sliders, where I darkened the Highlights, lightened the Shadows and added some more Exposure. I Shift-clicked the Whites and Blacks sliders to auto-set these and added a small amount of Clarity.



2 Darken the sky

To help deal with the contrast between the boys and the sky, I added a Radial Filter adjustment to the middle of the image that darkened the outer areas. I followed this by adding a Graduated Filter adjustment that added more contrast and Clarity to the sky. I did this to add more definition to the clouds. I then used the Brush Edit mode to erase the effect where it overlapped the boys.



3 Adjust the capture sharpening

To achieve the optimum capture sharpening on the boys' faces, in the Detail panel I edited the default sharpening settings. I increased the Amount, setting this to +65. I increased the Radius and Detail sliders slightly. I then dragged the Masking slider to the right to apply a contrast mask that protected the flat areas (such as the skin tones) from being sharpened.

Martin Evening is a noted expert in both photography and digital imaging. He is well known in London for his fashion and beauty work, for which he has won several awards. Martin has worked with the Adobe Photoshop and Adobe Lightroom engineering teams over many years and is one of the founding members of a software design company. Visit www.martinevening.com

The king of noise

As part of our ISO special, **Steve Davey** sees how the mighty Nikon D5 copes with low light and more on two demanding trips

It felt good to get a pro-body Nikon DSLR back into my hands. Apart from my first camera – a fully manual Pentax MX film SLR – I have only ever shot Nikon. I started with a Nikon F-801 as a student, but soon moved on to a couple of second-hand F4s and arguably my favourite cameras of all time, a brace of rock-solid F5s that I still have.

My first foray into digital photography was with the Nikon D2X. I had two of them, later replaced with the fantastic D3X. The resolution of the 24.6-million-pixel D3X far exceeds that of scanned film, but the camera also offered fantastic tonality and dynamic range in an ergonomic and robust pro-body.

As well as the ergonomics, I have always found Nikon pro bodies to be solid and resilient. They seem to put up with a lot of punishment before needing repair. That said,

an inevitable part of being a travel and location photographer is that I flog my kit. In the past, I have had the entire shutter block of an F4 replaced in Bangkok, managed to drown a D2X in French Polynesia and fell on to a D3X and 70–200mm lens while fending off a rabid Laotian dog, cracking two ribs and literally tearing the face off the camera.

I moved from the D3X to the D800 for its astonishing resolution – a camera that became

even sharper and gained a stop of ISO with the D810. Even with the MB-D12 battery pack it has much of the usability, but not the ergonomics, of the pro-bodies. The D800 has survived fairly unscathed, but the D810 did have a bit of a tripod incident. Combine these repairs with routine camera and lens servicing, and it is safe to say that I am no stranger at the Nikon Professional Services (NPS) Service Centre at Kingston in Greater London.



At a glance

- 36.3-million-pixel, full-frame
- Highlight priority metering
- New Kevlar shutter
- New sRAW format
- ISO 32–51,200 (extended)
- 3.2in, 1.23-million-dot LCD
- Price £2,700 (body only)



Having an ISO of 16,000 allowed me to shoot the action at 1/800sec



At ISO 10,000 I could still shoot at 1/200sec at 210mm on the 80–400mm



A sensitivity of ISO 16,000 allowed for settings of 1/1250 second at f/7.1. There was very little noise in this shot, and a touch of Luminance Noise reduction in Lightroom cleaned it up further

I am not sure whether it is because of this familiarity with the NPS Service Centre, or in spite of it, that led Nikon to lend me a D5 for an extended period. I had a couple of jobs where I really thought this camera could make the difference – a commission to photograph an ice-hockey camp in Prague in the Czech Republic for a Korean magazine and leading a photography tour in Myanmar [Burma] for two weeks. Each of these jobs needed something that my existing kit really couldn't provide. But would the D5 be the camera I was looking for, and would I be able to justify 'investing' in one?

Good ISO performance

Shooting ice hockey demands good ISO performance and excellent autofocus. It turns out that the D5 excels at both. The Czech International Ice Hockey Camp is held in quite an old rink, which meant that the light levels were relatively low. Combined with fast action, this is a potential nightmare for photography.

Unlike many modern rinks, there were no specific photography stations so I had to rely on a step ladder to peer over the protective screens, or just hang out in the team area. This meant that I had to shoot with longer lenses than I might have wanted. I travel with a Nikon 70-200mm f/2.8 VR II

and a 80-400mm f/4.5-5.6 VR. The aperture of the latter is not ideal, but as a travel photographer I have to prioritise getting my gear on to planes and portability. The size and weight of the 80-400mm is perfect, and most of the time I don't use it at the maximum aperture anyway.

The main shouting point of the D5 is ISO performance. The stated top ISO (before the H range) is a phenomenal ISO 101,520. Before looking at the ISO performance in more detail, I have to make a small confession. I shoot images for quality magazines, so I am somewhat intolerant of noise on images. If you are shooting press work or images for use on the internet, then noise is unlikely to be such an issue. The D810 will officially shoot to ISO 12,800. Even when using noise-reduction software, I generally won't push this past ISO 6,400 to avoid unacceptable noise.

The high ISO performance of the D5 is exceptional – especially JPEGs that have been treated with the D5 noise-reduction algorithms. For my work, I would happily shoot at ISO 25,600, but at a pinch I would go to ISO 51,200. At these ISOs any underexposure will exacerbate the noise considerably and darker subjects will show more prominent noise than lighter areas. At higher ISOs than 51,200 I

found the noise was so prominent that the camera struggled to render a decent black.

This sort of ISO performance is phenomenal, and made all the difference when shooting fast-moving sports. I was able to shoot with a shutter speed 2 stops faster and a stop smaller aperture than with the D810.

One thing I noticed very quickly was that the lighting was not consistent. Every few shots I would get a darker frame with a pronounced red cast. A quick recourse to Google highlighted the Flicker control, which is designed to compensate for the variation in the consistency of older artificial lighting. Essentially, the camera will monitor the lighting and only allow you to take shots when the conditions are constant. There is a slight reduction in the shooting speed, as the camera staggers the exposures so it is only shooting when the lighting is fully illuminated, but this is only by a fraction of a second. The benefits of avoiding a partially semi-dark frame, and the problem of having to lighten just a portion of an underexposed scene, with the resultant noise issues, make this a small price to pay.

The focusing on the D5 is incredibly responsive, even when shooting at a high frame count. In normal shooting I use single-point focus and move it over the

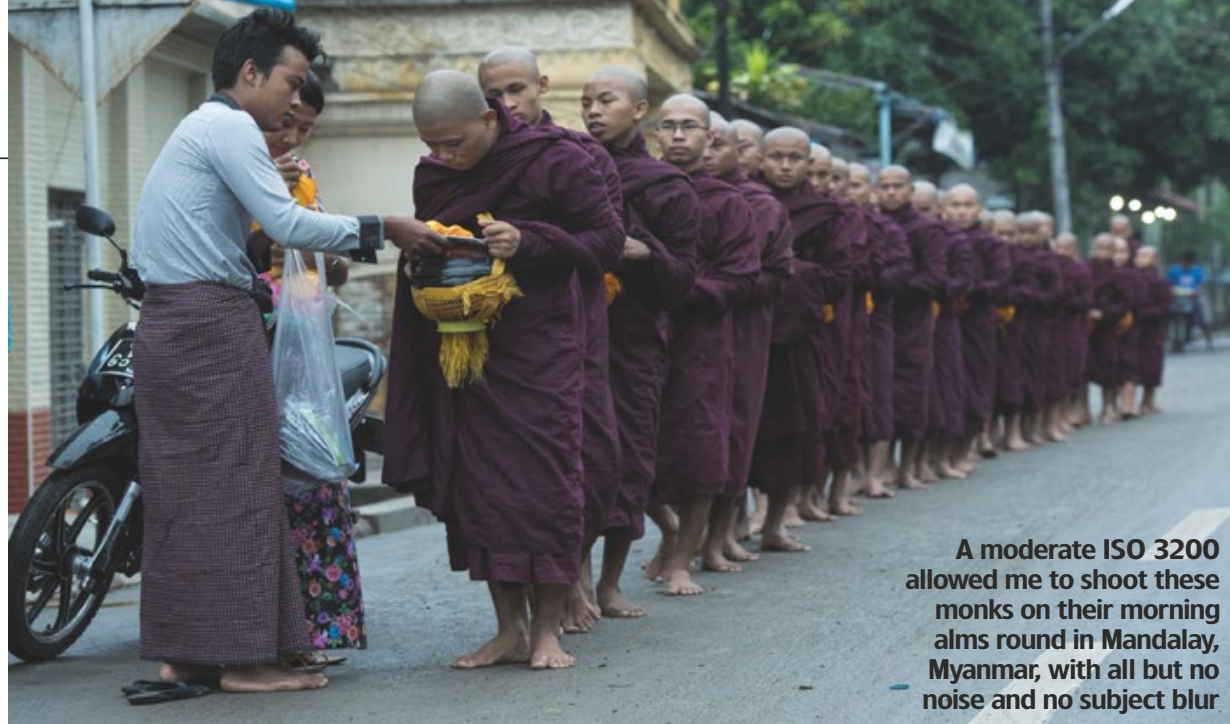
➤ subject using the multi-selector. With AF-C selected, the camera will continually refocus, and I can easily lock the focus by hitting the (customised) AE-L button. I have tried back-button focus, but I like to tweak the single-point position as I am shooting, which doesn't work if my thumb also has to keep the AF-On button pressed.

For the ice hockey, I followed the suggested settings on Nikon's website: AF-C continuous focusing with 25-point dynamic-area AF. I was also able to customise the focus tracking, setting the Blocked shot AF response to 1 (quick) and the Subject motion to Erratic.

Focusing with the new Multi-CAM 20K module was fast and accurate, even when shooting at a high frame rate. There is always the issue of the camera focusing on the back of a player in the foreground and not the facing player behind them. Depending on the distance between the two players, this was slightly mitigated by the extra depth of field that I was able to achieve due to the high ISO performance of the camera.

I quickly switched to the 3D-tracking focus mode, though, which will lock on to a subject and select whichever of the 153 focus points that will keep it in focus. Turning on the 3D-tracking face-detection made this focus mode even more effective.

Nikon DSLRs have been able to manually fine tune focus on a lens for some time, but the D5 takes this to a whole new level with its auto AF Fine Tune function. I have no scientific evidence for this, but personally I have never had the 80-400mm produce such sharp and well-focused images! Whatever the D5 was doing under the hood, it seems to have been particularly effective in this case.



A moderate ISO 3200 allowed me to shoot these monks on their morning alms round in Mandalay, Myanmar, with all but no noise and no subject blur

Life on the road

It comes as no surprise that the D5 excels at sports photography, especially sports photography in less-than-ideal lighting conditions, but is it of any use for the travel photographer? Specifically, could I justify buying one, even though it costs double the amount I spent on my last car?

The solidity and weather-sealing of the D5 lends itself to life on the road – especially in more dusty parts of the world. It is a heavy camera, but only about 70g more so than the D810 with the MB-D12 battery pack. What is phenomenal, though, is the battery life. I was worried about having only one battery for the camera, but I needn't have stressed as I never got close to running it down.

Officially, the camera can shoot 3,780 shots on a single charge. Granted, this is a little over five minutes at 12 frames per second, but in practical terms the camera should easily last for a day of shooting. The D5 comes with the MH-26a battery charger, which charges two batteries sequentially, so as long as you get a

few hours of power every few days, battery life will never be an issue.

For my day job, low-light performance is always a problem. For this particular trip I had to shoot pagoda interiors, monks on their morning alms round at dawn and a number of low-light portraits.

The ISO performance of the D5 made a massive difference in a number of scenarios. I am pretty good at holding the camera still in low light, but I wanted to avoid subject blur that can be an issue with even eminently handholdable shutter speeds. A lesser, but still significant, issue is achieving adequate depth of field, which is why simply shooting with a lens with a wide f/1.8 aperture is not always the solution.

One time when I needed to avoid subject blur was when photographing monks on their morning alms round in Mandalay. Even though they walk with bare feet, the monks keep up a surprising pace. They start out just before sunrise and the D5 meant I could photograph at this atmospheric time of day.

Sunrise at the Shwedagon Pagoda in Yangon, Myanmar. With the D5 you can handhold in low light with confidence





This was shot on a tripod, but an ISO of 12,800 allowed for an exposure of 0.4sec – enough to avoid subject blur. There was little noise, but luminance noise reduction in Lightroom cleaned up the darker areas

We also visited some tribes in the remote Chin Hills, where many of the older women have traditional face tattoos. A few of us trekked down to a village where we were met by elders wearing loincloths and carrying bows and arrows. They greeted us with buffalo horns full of local hooch and then ushered us into a darkened hut to meet the other elders. It was a stormy and overcast day, and the light levels were low outside, but inside it was almost dark. However, I was able to keep shooting. The D5's focusing was accurate even in low light, and a relatively moderate ISO of 12,500 meant that I could shoot at 1/125sec at f/6.3 with little or no noise.

After a bit more drinking we all trooped outside to fire arrows at a target in front of a bank of mud, and then I was offered the chance to fire an old muzzle-loading hunting musket. However, even at 12fps, the D5 missed both opportunities at recording the arrow flying through the air, although when I had a turn someone shooting with a Canon EOS-1D X did manage to freeze the arrow as it left my bow. This may have had something to do with my arrow speed, though!

As a part of the Myanmar trip, I took the group to the Taunggyi Balloon Festival near Inle Lake. At this traditional event, giant decorated paper balloons are inflated and then floated into the night sky. The twist is that these balloons have great baskets of fireworks slung underneath and as they rise they fire out a barrage of explosives.

If it all works perfectly, the balloons drift away and spew the fireworks from a safe height. Unfortunately, though, inflating a paper hot-air balloon with fire is not an exact science, and sometimes the balloons linger much lower and closer to the crowd, and on one occasion the basket of fireworks dropped from the ascending balloon into the crowds.

I had found a vacant wooden TV platform and was photographing as the basket fell to earth. The crowds scattered, as they knew what was coming, but I didn't. Suddenly, the sky was lit up by a tremendous explosion. Massive pyrotechnics were shooting up into the air and quite a few were shooting over each of my shoulders.

I am not saying that the only reason I kept shooting was that I felt safe with my head

Steve's top features

- 1** Superior high ISO performance – even being conservative, the D5 will allow you to shoot between ISO 25,600 and 51,200 and still get sharp, relatively noise-free shots.
- 2** Unparalleled battery life – 3,780 shots on a single charge mean that you should never run out of juice.
- 3** Robust and ergonomic body – the D5 will keep out most of the elements, especially if combined with professional weather-sealed lenses. It should also survive the knocks and bumps of life on the road.
- 4** Speed and accuracy of focusing – the Multi-CAM 20K module will ensure that more of your shots are in focus, especially when you are photographing action.
- 5** Customisation of controls – you can assign a range of custom functions to various buttons, meaning that you can make the D5 behave exactly how you want, and seldom need to hit the menus for normal day-to-day shooting.
- 6** 12 frames per second drive – there will always be times when 12fps will increase your chance of capturing the shot.

‘The D5 will keep out most of the elements, especially if combined with professional weather-sealed lenses’

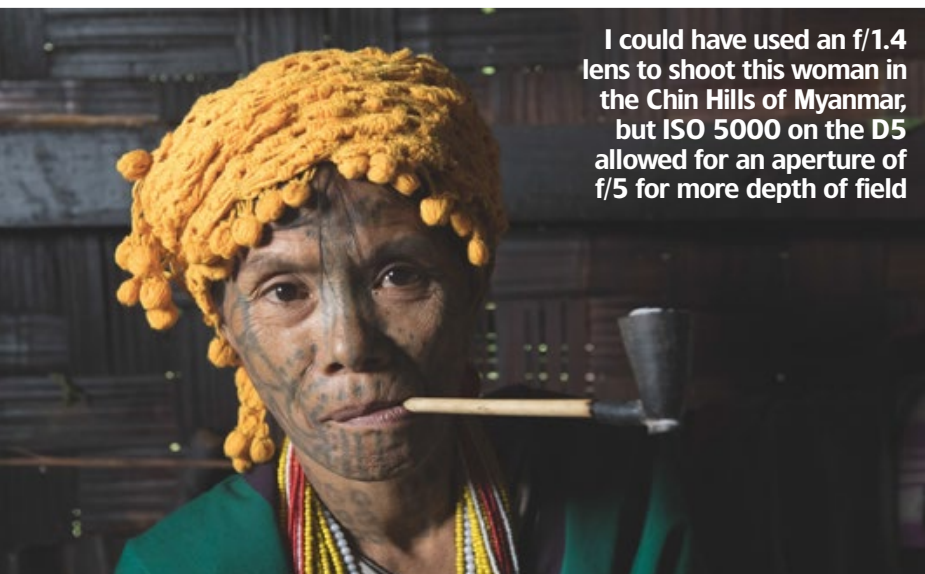
behind the solid bulk of the D5, but the solid clunking of the shutter going at something close to the maximum of 12fps was reassuringly comforting. I even remember adjusting the shutter speed with the rear command wheel (I always shoot in manual) as the explosions got even brighter. This dial felt responsive and, again, inspired confidence – even with projectiles flying towards my head.

Multi-selector dial

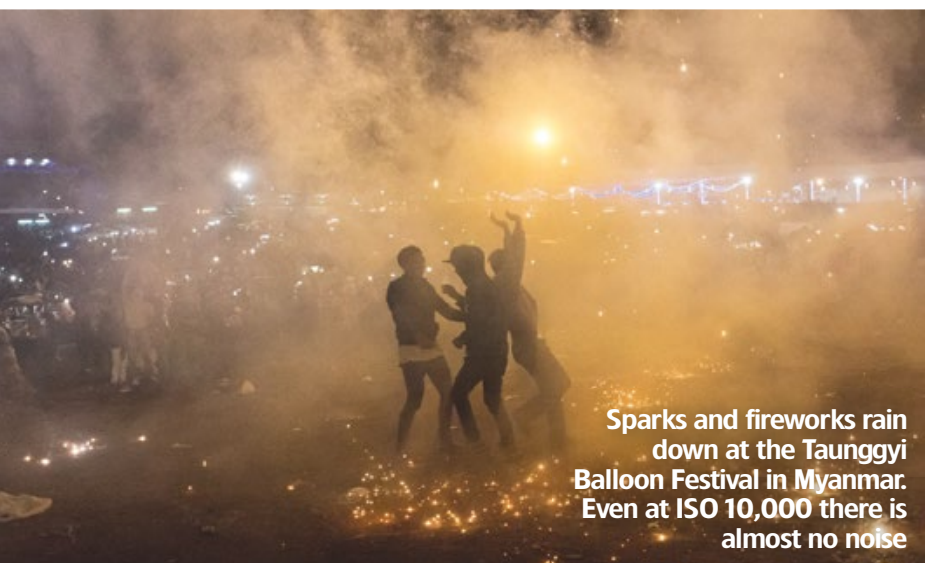
Not everything about the D5 inspires such confidence, though. The multi-selector dial has the same slushiness as the D800 and D810 when selecting the active-focus sensor. On the D5, though, there is an alternative. In both horizontal and vertical orientation there is a stubby alternative cylindrical selector knob that sticks up a few millimetres. This makes any selections much crisper and more deliberate.

In fact, it is almost as if Nikon wants to minimise the use of the multi-selector dial anyway. The D5 has so many buttons that you will seldom need to hit the menus anyway. There are two more





I could have used an f/1.4 lens to shoot this woman in the Chin Hills of Myanmar, but ISO 5000 on the D5 allowed for an aperture of f/5 for more depth of field



Sparks and fireworks rain down at the Taunggyi Balloon Festival in Myanmar. Even at ISO 10,000 there is almost no noise



Paper balloon with exploding fireworks. ISO 10,000 allowed for a shutter speed of 1/250sec

➤ customisable function buttons and an extra couple of buttons on the back of the camera, which illuminate for easier operation in the dark.

The D5 also has a touchscreen. This is usually a feature found only in consumer cameras, but in the D5 it allows for much quicker scrolling through pictures and with a simple double tap; zooming to 100% to check focus. Interestingly, Nikon has opted not to allow touch selection of the menu items, presumably to stop options being inadvertently selected in normal operation.

I first dismissed this as a gimmick, but I have to confess I am now pretty addicted to it. Reviewing and checking pictures is a lot more intuitive, and much quicker. The screen is tremendously responsive and the tap-to-zoom function is perfect for checking focus.

I found that with so many buttons, each of which can be programmed to have such significant functions, I had to be careful about pressing them by accident. I tend to carry my cameras in one hand, holding on to the grip. With the Preview (PV) and Function 1 and Function 2 buttons right under the grip, I managed to keep engaging the auto-bracket function until I changed the controls. This was probably more of a case of familiarity and the need for customisation, but it does highlight the potential problems that can be caused when too many buttons are crammed into a small space.

The range of customisable functions that can be applied to these buttons is quite

broad. You can programme any of these buttons to preview depth of field, change the AF modes, lock any combination of autoexposure or focus, control the flash, shoot a burst of bracketing shots, select the raw format, select any of the metering modes, show the viewfinder grid or artificial horizon, select a preset menu item or lock up the mirror and shoot at 14fps.

There are a number of features that are specifically designed for the professional journalist or sports photographer. The standard pro-body voice-note facility is there, although interestingly it uses the F3 function button, which is also used for the network control facility, so presumably both functions cannot easily be selected at the same time without recourse to menus. There are ten user-editable IPTC fields that can be applied automatically to any shot images. If you know roughly what you are shooting, this will make the process of captioning and editing the metadata of images quicker, allowing images to be filed quicker.

I could have done with this facility myself, as after the explosions at the balloon festival I hurried back to my lakeside hotel to file a selection of the pictures to a news agency. These shots were picked up by *The Sun*, so it was worth the few hours spent on my laptop.

On these two trips I had enough to concentrate on shooting stills, so I didn't experiment with the 4K video functions. However, there were a number of times when I used live view to allow me to shoot

from a higher or lower angle. The viewing angle of the LCD screen is exceptionally wide, so composing pictures while shooting over people's heads, or from ground level, is easy and discreet.

Conclusion

So, at a shade over £5,000 will I be rushing out to order a D5 any time soon? I have to say that I am sorely tempted. The camera is fantastic in almost every way. The drive speed, build quality and ISO performance are legendary and currently market-leading. It is a bit of a thoroughbred, though, and just like you wouldn't use a racehorse to pull a cart, you probably wouldn't want to use the D5 as an all-purpose camera.

The 21-million-pixel resolution is lower than the D810's I currently travel with, and more scientific reviewers have stated that even at low ISOs the dynamic range is lower too. The D5 is a high ISO and sports beast and at that it excels. So the question for me is whether I can justify the weight and, of course, the cost for this specialist camera to sit in my bag waiting for low-light scenarios. Although I am tempted to sell off some of my pensioned-off gear and take the plunge, I am still undecided bearing in mind the current state of the industry.

There are also rumours of a DF2 to coincide with Nikon's centenary in 2017 to consider. If the DF is anything to go by, this might have the same sensor and ISO performance of the D5 even if it is unlikely to have the same shooting speed and autofocus.



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Theme	Opens	Closes
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Round Two: Environment	1 Nov	31 Dec
Round Three: People	1 Jan	28 Feb

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DM-E1 Worth £274.99

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Runner-Up
Canon Directional Mic DM-E1
Worth £274.99

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Photo printing problems

Q I have recently changed from a PC to a laptop. I use Adobe Photoshop Elements 14, and the laptop is running Microsoft Windows 10, while my old PC used Windows 7. When printing I get better results with Epson Easy Photo Print and the Microsoft file than from Elements. The colours are close to screen colour and the photos are sharper. I use an Epson Stylus Photo P50 printer and Epson Premium Glossy Photo Paper that automatically adjusts to the laptop. I have tried all sorts of adjustment in Elements, but to no avail. Can you help?

John Farebrother

A It's difficult to pinpoint this problem without examining both the old computer's colour-management set-up and comparing it with the new one. Probably the best advice I can give is to help you to ensure your current system and Photoshop Elements are properly colour managed. You should invest in a display calibrator, or at least borrow one. These start at around £79 for an X-Rite ColorMunki Smile, for example. Once your screen has been

calibrated, within Elements, open the menu Edit>Color Settings. Select 'Always Optimize Colors For Computer Screens'. This will make sRGB your working space and should work well for images to be posted online or in documents and for printing to your Epson P50 printer. Make sure when saving images that you check the sRGB option.

Depth of field dilemma

Q I took a picture with a full-frame DSLR with a 50mm f/1.4 lens at open aperture, with a view to getting a shallow depth of field. The resulting depth of field on the photo was much less than I saw through the viewfinder, but why should this be the case when I was viewing the subject and taking the subject at the same aperture of f/1.4? Does the optical system somehow increase the depth of field as the image passes from the lens to the eyepiece?

Andrew S Redding

A In short, what you're seeing is a consequence of how the focusing screens on DSLRs are designed. Specifically, they have to work well with zoom lenses that have



Macro focus rails rarely include quick-release platforms, but you can use an add-on one

BOTH PICTURES © IAN BURLEY

Dovetailing a focus rail

Q I have a Manfrotto tripod with a dovetail type of quick-release head and the corresponding plate attached to my camera. I would like to fix a focus rail to the tripod, which can be achieved by purchasing a Manfrotto additional camera plate. However, I would like to retain the dovetail plate on my camera to save having to change it every time I use the focus rail, but I cannot find a dovetail head that can be attached to the focus rail to enable the camera being attached to it. Do you have any suggestions?

Gerald Peppiatt

A With the information I have to go on, let's assume you have something like a Manfrotto Top Lock head and plate, which is Manfrotto's version of the Arca Swiss quick-release dovetail head/clamp arrangement. It's quite common for focus rails to incorporate the Arca Swiss-compatible dovetail for mounting the rail to the head so you may not actually need an extra plate, although there is a caveat I'll explain later. There are also lots of focus rails that have an Arca Swiss-compatible quick-release clamp for mounting a camera or lens fitted with a dovetail plate. Even if your choice of rail doesn't have a dovetail clamp, you can fit one onto the rail's basic clamp. Manfrotto's own MSQ6 adapter is one choice, but there is a lot of evidence that non-Manfrotto dovetail plates may not lock securely in a Manfrotto clamp, so it might be safer to get a generic Arca Swiss-compatible clamp. One of many examples is the Delkin Fat Gecko Quick Release Kit, supplied with a plate for around £30. The same warning applies to the dovetail of the rail itself – it may not lock to a Manfrotto clamp. However, Manfrotto plates work fine with generic clamps.



DSLR viewfinders show extended depth of field with fast lenses

slow variable maximum apertures of f/4–f/5.6, while also taking into account the fact that a large fraction of the light coming through the lens is split away to the camera's autofocus system. Such focus screens are therefore designed to transmit lots of light coming from narrow angles. But it turns out that this means they're bad at giving an accurate representation of depth of field

with larger aperture primes, and instead tend to show an image approximating to f/2.8. Switching to live view should give a much more accurate depiction of the true state of affairs, although counter-intuitively in bright light you may need to press the depth of field preview button, to force the camera to open up the lens's aperture fully.

Q&A compiled by Ian Burley

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In the bag



Laurie Campbell has spent more than 40 years

photographing the landscape, wildlife and flora of Scotland in his own style. Visit www.lauriecampbell.com

Nikon 200mm f/4 AF macro lens

1 Reputed to be Nikon's sharpest ever macro lens, the long focal length of the 200mm f/4 AF allows a greater working distance when photographing small, skittish subjects and the narrow angle of view is perfect for controlling backgrounds and isolating subjects.

Gitzo G1548 carbon-fibre tripod with Sachtler DV 8 fluid head

2 This combo is well able to support any of my long heavy Nikon lenses, including the 200mm f/2, 200-400mm f/4 and 500mm f/4. The Sachtler head should last a lifetime and is wonderfully smooth with the option to adjust the drag when panning.

Nikon D3X

3 I bought the D3X in 2010, and it's not common for such an old DSLR to still be in constant use. Built like a tank, I rarely use it above ISO 200 and mostly on a tripod. It is my first choice for virtually any subject, including some wildlife, most macro and virtually all my landscape work.

Nikon 17-35mm f/2.8 AF-S lens

4 The 17-35mm f/2.8 AF-S, my 200mm f/4 macro AF and 500mm f/4 VR are easily my most used Nikon lenses. The close focus of the 17-35mm is good for photographing subjects in context, whether they are plants or animals. It is very sharp, durable and good for landscapes too.

Leica 8x42 BGA binoculars

5 Good binoculars are essential for watching those animals that you plan to photograph without

having to be close enough to risk disturbing them. These Leica 8x42 BGA binoculars are completely weatherproof and are also excellent in poor light. I've even used them for badger watching!

Circular polarising filters

6 A 77mm slimline B+W polarising filter with two stepping rings and a Nikon drop-in improve colour saturation by reducing reflections on everything from the surface of foliage to water.

List of kit: Nikon D3X, Nikon D4, Gitzo GT2540F Safari tripod, GH2750 head, Gitzo G1548 tripod, Sachtler DV 8 fluid head, Nikon 24-70mm f/2.8 AF-S, Nikon 200mm f/4 AF macro, Nikon 70-200mm f/2.8 AF-S II, Nikon 500mm f/4 VR, Nikon 17-35mm f/2.8 AF-S, Laowa 60mm f/2.8 macro, Laowa 15mm f/4 macro, Nikon TC-14E III teleconverter, Leica 8x42 BGA binoculars, Nikon SB-800 Speedlight, Lastolite reflector, Wimberley Plamp, Singh-Ray graduated filters, Circular polarisers (77mm and drop-in for large telephoto lenses).



ALL PICTURES © LAURIE CAMPBELL

Common sundew (*Drosera rotundifolia*) on the Isle of Lewis in the Outer Hebrides



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Tony Kemplen on the ...

Meopta Mikroma

Sometimes described as a spy camera, the Mikroma may be small but it's perfectly formed

The Mikroma is a little gem of a camera that was first made in the Meopta factory in Czechoslovakia in 1949. In addition to cameras, Meopta made a range of optical equipment. I remember our school darkroom had one of its enlargers. Reasonable quality photographic equipment from behind the Iron Curtain was commonplace in school and club darkrooms in the 1970s.

I like a bargain, and most of the cameras that I've accumulated over the past four decades have been from jumble sales, junk shops, charity shops and car-boot sales, but occasionally I've set my heart on a particular model, and with no real expectation of stumbling upon one in my usual haunts, resorted to going online to satisfy my craving. I paid around £60 for my Mikroma in 2011, and a quick check on eBay shows that this is about what they fetch today.

Sometimes described as a spy camera, the Mikroma takes 16mm film, but differs from many 16mm cameras in that it looks like a miniature 35mm model. Generally, 16mm cameras have a flatter profile. It may be small, but it's perfectly formed, although it does require good eyesight to see the scales and dials, and anyone with larger-than-average hands



The Mikroma takes 16mm film, but looks like a miniature 35mm model



A detail shot of King's College, Cambridge, taken with the Mikroma

may struggle to use it. The focus, aperture and shutter speed are all conventional, but the wind-on and shutter release set it apart from most cameras. They take some working out if you haven't got an instruction manual.

Sliding a metal bar outwards from the top of the camera body advances the film. This also cocks the shutter, and when released, fires it. There is no way to wind on without firing the shutter, short of holding the slider out, which is not practical for more than a few

seconds. That means you have to commit to taking a picture once you've wound on.

Two small metal cartridges are used to handle the film on the supply side. A simple chamber contains a coil of film, while the take-up chamber has a spool inside it, which engages

'The Mikroma looks like a miniature 35mm model'

with the spindle of the winding mechanism of the camera. With the aid of a changing bag it's simple, if a little fiddly, to load the required 90cm of film into the supply chamber. Once the end caps are securely snapped on, the rest can be done in daylight. Any 16mm film can be used, single or double perforated, although the image size is slightly reduced using the double perforated variety. I used a length of expired Ilford FP4 black & white negative film, taken from a 100ft reel that I picked up a few years ago. You can clearly see the perforations in this shot (above), which shows a detail of King's College, Cambridge. No doubt a regular user of the camera would be able to make allowances for this when composing their shot – something I'll need to address before I use it again.

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Tony Kemplen's love of photography began as a teenager and ever since he has been collecting cameras with a view to testing as many as he can. You can follow his progress on his 52 Cameras blog at 52cameras.blogspot.co.uk. More photos from the Mikroma are available at www.flickr.com/tony_kemplen/sets/72157627794368630.

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Buying Guide

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Our comprehensive listing of key specifications for cameras and lenses

Cameras

Interchangeable-lens cameras come in two types: DSLRs with optical viewfinders, and mirrorless models with electronic viewing

Controls

Entry-level cameras tend to have simple, easy-to-understand controls, while more expensive models add lots of buttons and dials to give quick access to settings.

Viewfinder

The biggest difference between DSLRs and mirrorless cameras is that the latter use electronic, rather than optical viewfinders. They're more power hungry, but can display more information and show exactly how your pictures will turn out.

Size and weight

Mirrorless models tend to be smaller and lighter than DSLRs, and not just the cameras themselves, but their lens systems, too. However there's still a wider choice of lenses available for DSLRs.



Handgrip

DSLRs traditionally have relatively large handgrips, while many mirrorless models have much smaller grips to keep size down. However some can accept accessory grips to improve handling with larger lenses.

Lens mount

Each camera brand uses its own lens mount, and mirrorless cameras use different lenses to DSLRs even from the same brand. However mirrorless models can often use DSLR lenses via a mount adapter.



ALMOST all serious photographers prefer to use cameras with interchangeable lenses, as this gives the greatest degree of creative flexibility. At one time, this meant digital single lens reflex (DSLR) cameras, but these have now been joined by mirrorless compact system cameras (CSCs) that use electronic viewfinders. Previously, these lagged behind DSLRs in some respects such as autofocus. But the

latest models have narrowed the gap considerably, and are true alternatives to DSLRs, offering the same image quality and creative options. Camera manufacturers offer a range of models, from simple, relatively inexpensive beginner-friendly designs through to sophisticated professional models. In the middle of the range you'll find enthusiast cameras with more advanced control layouts.

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DSLR cameras

				RESOLUTION	LENS MOUNT	MAX ISO	VIDEO	MIC INPUT	AF POINTS	BURST MODE (FPS)	VF COVERAGE (%)	BUILT-IN Wi-Fi	FLASH	SCREEN SIZE	ARTICULATED LCD	TOUCHSCREEN	BATTERY LIFE (SHOTS)	WIDTH (MM)	HEIGHT (MM)	DEPTH (MM)	WEIGHT
NAME & MODEL	RRP	SCORE	SUMMARY						SHOOTING				SCREEN				DIMENSIONS				
Canon EOS 1300D	£450	4★	Beginner-friendly model with simple controls and built-in Wi-Fi	18MP	Canon EF	12,800	1080p		9	3	95	•	•	3in			500	129	101.3	77.6	485g
Canon EOS 700D	£750	4.5★	Likeable entry-level DSLR, but sensor is now looking dated	18MP	Canon EF	12,800	1080p	•	9	5	95	•	•	3in	•		440	133	100	79	580g
Canon EOS 750D	£599	4★	Updates the EOS 700D with new 24MP sensor	24.2MP	Canon EF	25,600	1080p		19	5	95	•	•	3in	•	•	440	131.9	100.7	77.8	555g
Canon EOS 760D	£649	5★	Higher-end version of EOS 750D with improved control layout	24.2MP	Canon EF	25,600	1080p		19	5	100	•	•	3in	•	•	440	131.9	101	77.8	565g
Canon EOS 80D	£999	5★	Extremely capable mid-range DSLR for enthusiast photographers	24.2MP	Canon EF	25,600	1080p	•	45	7	100	•	•	3in	•	•	960	139	105.2	78.5	730g
Canon EOS 7D Mk II	£1599	4.5★	High-speed APS-C DSLR includes sophisticated AF system	20.2MP	Canon EF	51,200	1080p	•	65	10	100	•	•	3in			670	148.6	112.4	78.2	910g
Canon EOS 6D	£1700	4.5★	Canon's most affordable full-frame SLR includes Wi-Fi and GPS	20.2MP	Canon EF	102,400	1080p	•	11	4.5	97	•		3in			980	145	111	71	755g
Canon EOS 5D Mk III	£2999	5★	Great all-round DSLR for serious enthusiasts and professionals	22.3MP	Canon EF	102,400	1080p	•	61	6	100			3.2in			950	152	116	76	950g
Canon EOS 5DS	£2999		High-resolution model with 50MP sensor	50.6MP	Canon EF	12,800	1080p	•	61	5	100			3.2in			700	152	116.4	76.4	845g
Canon EOS 5DS R	£3199	5★	Same as the 5DS, but low-pass filter removed for maximum resolution	50.6MP	Canon EF	12,800	1080p	•	61	5	100			3.2in			390	152	116.4	76.4	845g
Canon EOS 5D Mk IV	£3599	4.5★	Hugely accomplished workhorse model, but pricey	30.4MP	Canon EF	102,400	3840p	•	61	7.7	100	•		3.2in		•	900	151	116	76	890g
Canon EOS-1D X Mk II	£5199		Professional high-speed sports and action model	20.2MP	Canon EF	409,600	3840p	•	61	14	100			3.2in	•	•	1,210	158	167.6	82.6	1,340g
Nikon D3300	£600	4.5★	Entry-level simple DSLR for beginners	24.2MP	Nikon F	25,600	1080p	•	11	5	95		•	3in			700	124	98	75.5	460g
Nikon D3400	£399		Adds Bluetooth to D3300 for connecting to smartphone	24.2MP	Nikon F	25,600	1080p	•	11	5	95		•	3in	•		tbc	124	98	75.5	445g
Nikon D5300	£830	4.5★	Ageing mid-range DSLR is now available at bargain prices	24.2MP	Nikon F	25,600	1080p	•	23	5	95	•	•	3.2in	•		700	125	98	76	530g
Nikon D5500	£720	4.5★	Excellent image quality and handling from a small DSLR	24.2MP	Nikon F	25,600	1080p	•	39	5	95	•	•	3.2in	•	•	820	124	97	70	470g
Nikon D5600	£800		Minor update to the D5500 adds Bluetooth smartphone connection	24.1MP	Nikon F	25,600	1080p	•	39	5	95	•	•	3.2in	•	•	970	124	97	78	465g
Nikon D7100	£1100	4.5★	A highly accomplished camera with excellent image quality and AF	24.1MP	Nikon F	25,600	1080p	•	51	6	100		•	3in			950	135	106	76	765g
Nikon D7200	£939	4★	Updates the D7200 with some useful extras such as Wi-Fi	24.2MP	Nikon F	25,600	1080p	•	51	6	100	•	•	3.2in			1,100	135.5	106.5	76	765g
Nikon D500	£1729	5★	Probably the best DX-format DSLR ever, with remarkable autofocus	20.9MP	Nikon F	1,640,000	3840p	•	153	10	100	•	•	3.2in	•	•	tbc	147	115	81	860g
Nikon D610	£1800	5★	Nikon's cheapest full-frame model with a solid feature set	24.3MP	Nikon F	25,600	1080p	•	39	6	100		•	3.2in	•		900	141	113	82	850g
Nikon D750	£1800	5★	Great all-round enthusiast full-frame model with tilting screen	24.3MP	Nikon F	51,200	1080p	•	51	6.5	100	•	•	3.2in	•		1,230	140.5	113	78	840g
Nikon DF	£2600	4★	Retro-styled full-frame model with excellent sensor	16.2MP	Nikon F	204,800	-		39	5.5	100			3.2in			1,400	143.5	110	66.5	765g
Nikon D810	£2699	5★	High-resolution full-frame SLR offers superb image quality	36.3MP	Nikon F	51,200	1080p		51	12	100		•	3.2in			1,200	146	123	82	980g
Nikon D5	£5199		Nikon's top-end sports and action model for professionals	20.8MP	Nikon F	3,280,000	3840p	l	153	14	tbc			3.2in	•	•	tbc	160	158.5	92	1,405g
Pentax K-S1	£550	4★	Pentax's entry-level DSLR comes in a range of colours	20.2MP	Pentax K	51,200	1080p	•	11	5.4	100		•	3in			tbc	92.5	120	69.5	498g
Pentax K-50	£600	4.5★	Large viewfinder and two control dials – unusual at this price	16.3MP	Pentax K	51,200	1080p		11	4	100		•	3in			410	130	97	71	650g
Pentax K-S2	£649	4.5★	Includes a fully articulated screen and in-body stabilisation	20.2MP	Pentax K	51,200	1080p	•	11	5.4	100	•	•	3in	•		410	122.5	91	72.5	678g
Pentax K-70	£600	4.5★	Solid performer that updates the K-S2 with a 24MP sensor	24.2MP	Pentax K	102,400	1080p		11	6	100	•	•	3in	•		410	125.5	93	74	688g
Pentax K-3	£950	4★	Well-featured enthusiast model with in-body image stabilisation	24.2MP	Pentax K	51,200	1080i	•	27	8	100		•	3.2in			560	131	100	77	800g
Pentax K-3 II	£769	4.5★	Updates the K-3, with built-in GPS instead of a flash	24.3MP	Pentax K	51,200	1080p	•	27	8.3	100			3.2in			tbc	131.5	102.5	77.5	785g
Pentax K-1	£1599	5★	The first Pentax full-frame DSLR is excellent value for money	36MP	Pentax K	204,800	1080p	•	33	4.4	100	•		3.2in	•		760	136.5	110	85.5	1,010g
Sony Alpha 58	£450	4★	Entry-level SLR-like camera but with electronic viewfinder	20.1MP	Sony A	16,000	1080p		15	5	100		•	2.7in	•		690	129	95.5	78	492g
Sony Alpha 68	£479	3★	Excellent AF and sensor, but low-resolution LCD screen and no Wi-Fi	24MP	Sony A	25,600	1080p	•	79	8	100		•	2.7in	•		tbc	142.6	104.2	82.8	675g
Sony Alpha 77 II	£1000	4.5★	Impressive autofocus and fast shooting, plus good handling	24.3MP	Sony A	25,600	1080p	•	79	12	100	•	•	3in	•		480	142.6	104	81	647g
Sony Alpha 99	£1800	4★	Fast-shooting SLR-like camera with an electronic viewfinder	24.3MP	Sony A	25,600	1080p	•	19	10	100		•	3in	•		500	147	111	78	812g
Sony Alpha 99 II	£2999		Places the superb sensor from the A7R II in a DSLR-styled body	42.4MP	Sony A	102,400	3840p	•	79	12	100	•	•	3in	•	•	100	142.6	104.2	76.1	849g

ALL PRICES ARE RRP'S. STREET PRICES MAY VARY

We've tried our hardest to ensure that the information in this guide is as complete and accurate as possible. However we don't have space to list every camera and lens on the market, and some errors will inevitably have crept in along the way. We advise double-checking any crucial specifications or requirements with a reputable retailer or the manufacturer's website before making a major purchase. If you spot an error please let us know by emailing amateurphotographer@timeinc.com.

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Mirrorless cameras				Resolution	Lens Mount	Max ISO	Video	Mic Input	AF Points			Burst Mode (FPS)	Viewfinder (%)	Built-in Wi-Fi	Flash	Screen Size	Articulated LCD	Touchscreen	Battery Life (shots)	Width (mm)	Height (mm)	Depth (mm)	Weight
Name & Model	RRP	Score	Summary						Shooting							Screen				Dimensions			
Canon EOS M10	£399		Compact, extremely simple CSC designed for beginners	18MP	Canon M	25,600	1080p		49	4.6		•	•		•	•	•	255	108	66.6	35	301g	
Canon EOS M3	£599	4★	Mid-range model with enthusiast controls but no viewfinder	24.3MP	Canon M	25,600	1080p	•	49	4.2		•	•		•	•	•	250	110.9	68	44.4	366g	
Canon EOS M5	£1049	4★	DLSR-style mirrorless camera combines speed and good handling	24.2MP	Canon M	25,600	1080p	•	49	9	•	•	•		•	•	•	295	115.6	89.2	60.6	427g	
Fujifilm X-A10	£500	4★	Simple entry-level CSC with tilting screen for selfies	16.3MP	Fuji X	25,600	1080p		49	6		•	•		•	•	•	350	119.6	67.4	40.4	331g	
Fujifilm X-A3	£599		Fuji's budget range of viewfinderless CSCs gains 24.2MP sensor	24.2MP	Fuji X	25,600	1080p		9	10		•	•		•	•	•	410	116.9	66.9	40.4	339g	
Fujifilm X-E2S	£549	4★	Rangefinder-style design with viewfinder and analogue controls	16.3MP	Fuji X	51,200	1080p	•	49	7	•	•	•		•	•	•	350	129	74.9	37.2	350g	
Fujifilm X-T10	£499	4.5★	Compact and very likeable camera with many features from the X-T1	16.3MP	Fuji X	51,200	1080p	•	77	8	•	•	•		•	•	•	350	118.4	82.8	40.8	381g	
Fujifilm X-T20	£799		Small SLR-style model with strong feature set including touchscreen	24.3MP	Fuji X	51,200	3840p	•	325	8	•	•	•		•	•	•	350	118.4	82.8	41.4	383g	
Fujifilm X-T1	£1100	5★	Retro design based around analogue control dials and large EVF	16.3MP	Fuji X	51,200	1080p	•	49	8	•	•			•	•	•	350	129	89.8	46.7	440g	
Fujifilm X-Pro2	£1349	5★	Flagship model with unique optical / electronic hybrid viewfinder	24.3MP	Fuji X	51,200	1080p	•	77	8	•	•			•	•	•	250	140.5	82.8	45.9	495g	
Fujifilm X-T2	£1450	5★	Superb image quality and handling make it the best APS-C CSC to date	24.3MP	Fuji X	51,200	1080p	•	325	14	•	•			•	•	•	340	132.5	91.8	49.2	507g	
Leica TL	£1350		Stylish aluminium body and touchscreen-led control	16MP	Leica L	12,500	1080p		195	5		•	•		•	•	•	tbc	134	69	33	384g	
Leica SL	£5500	4★	Leica's full-frame CSC has an astonishing viewfinder	24MP	Leica L	50,000	4096p		49	11	•	•			•	•	•	400	147	104	39	847g	
Nikon 1 J5	£349		Nikon's latest CSC aims to attract both beginners and enthusiasts	21MP	Nikon 1	12,800	3840p		171	60		•	•		•	•	•	250	98.3	59.7	31.5	265g	
Nikon 1 AW1	£749	3.5★	High-end CSC is waterproof and shockproof	14.2MP	Nikon 1	6400	1080p		41	15		•	•		•	•	•	220	113	71.5	37.5	356g	
Olympus PEN E-PL7	£499	4★	High spec, compact size and superb image quality	16MP	Mic4/3	25,600	1080p		81	8		•	•		•	•	•	350	114.9	67	38.4	357g	
Olympus PEN E-PL8	£399		Retro external design hides serious specifications	16.1MP	Mic4/3	25,600	1080p		81	8.5		•	•		•	•	•	350	117.1	68.3	38.4	374g	
Olympus OM-D E-M10 II	£549	4.5★	Mid-range model has a strong feature set and performs very well	16.1MP	Mic4/3	25,600	1080p		81	8.5	•	•	•		•	•	•	320	119.5	83.1	46.7	342g	
Olympus OM-D E-M5 II	£900	5★	Combines great handling and image quality with stylish looks	16MP	Mic4/3	25,600	1080p	•	81	10	•	•			•	•	•	750	123.7	85	44.5	469g	
Olympus PEN-F	£1000	5★	Lovely retro rangefinder-styled CSC with built-in viewfinder	20.3MP	Mic4/3	25,600	1080p		81	10	•	•	•		•	•	•	330	124.8	72.1	37.3	427g	
Olympus OM-D E-M1	£1300	5★	Fully weather-proofed and Wi-Fi enabled pro-level CSC	16.8MP	Mic4/3	25600	1080p	•	81	10	•	•			•	•	•	330	130	93.5	63	497g	
Olympus OM-D E-M1 II	£1850	5★	Superb AF system, super-fast shooting and remarkable in-body IS	20.4MP	Mic4/3	25,600	3840p	•	121	18	•	•			•	•	•	tbc	134.1	90.9	68.9	574g	
Panasonic Lumix G7	£679	4★	4K video capture in a relatively inexpensive SLR-style CSC	16MP	Mic4/3	25,600	3840p	•	49	V 8	•	•	•		•	•	•	360	124.9	86.2	77.4	410g 4	
Panasonic Lumix G80	£699	4.5★	DSLR-style model for enthusiasts with in-body IS and 4K video	16MP	Mic4/3	25,600	3840p	•	49	9	•	•	•		•	•	•	330	128.4	89	74.3	505g	
Panasonic Lumix GF7	£420	4★	Compact, great image quality and good for selfies	16MP	Mic4/3	25,600	1080p		23	5.8		•	•		•	•	•	230	106.5	64.6	33.3	266g	
Panasonic Lumix GX800	£500		Tiny pocket CSC with tilting screen and 4K video	16MP	Mic4/3	25,600	3840p		49	5.8		•	•		•	•	•	210	106.5	64.6	33.3	269g	
Panasonic Lumix GX80	£599	4.5★	Well-judged compact model with IS, tilting screen and viewfinder	16MP	Mic4/3	25,600	4096p		49	8	•	•	•		•	•	•	290	122	70.6	43.9	426g	
Panasonic Lumix GX8	£1000	5★	In-body stabilisation and tilting viewfinder in a large rugged body	20.3MP	Mic4/3	25,600	3840p	•	49	8	•	•			•	•	•	330	133.2	78	63.1	487g	
Panasonic Lumix GH4	£1300	4★	Both 4K video quality and still images are impressive	16MP	Mic4/3	25,600	4096p	•	49	12	•	•	•		•	•	•	500	133	93	84	560g	
Panasonic Lumix GH5	£1299		Video-focused premium CSC gains in-body stabilisation	20.2MP	Mic4/3	25,600	4096p	•	225	12	•	•			•	•	•	410	138.5	98.1	87.4	725g	
Sony Alpha 5000	£420	4★	Simple, compact model aims to compete with entry-level DSLRs	20.1MP	Sony E	16,000	1080p	•	25	3.5		•	•		•	•	•	420	110	63	36	296g	
Sony Alpha 5100	£549	4★	One of the very best entry-level cameras for video and image quality	24MP	Sony E	25,600	1080p		179	6		•	•		•	•	•	400	110	63	36	283g	
Sony Alpha 6000	£670	4.5★	Sophisticated AF and an impressive APS-C sensor	24MP	Sony E	25,600	1080p		179	11	•	•	•		•	•	•	310	120	67	45	344g	
Sony Alpha 6300	£1000	4.5★	Premium CSC that boasts fast AF tracking and 4K video	24.2MP	Sony E	51,200	3840p	•	425	11	•		•		•	•	•	350	120	66.9	48.8	404g	
Sony Alpha 6500	£1500		Adds in-body image stabilisation to the A6300 design	24.2MP	Sony E	51,200	3840p	•	425	11	•		•		•	•	•	350	120	66.9	53.3	453g	
Sony Alpha 7	£1300	4.5★	One of the lightest, smallest full-frame cameras	24.3MP	Sony E	25,600	1080p	•	117	5	•	•			•	•	•	340	127	94	48	474g	
Sony Alpha 7 II	£1498	5★	The full-frame A7 II includes in-body image stabilisation	24.3MP	Sony E	25,600	1080p	•	117	5	•	•			•	•	•	350	126.9	95.7	59.7	556g	
Sony Alpha 7R	£1700	4.5★	Same body design as the Alpha 7 but higher resolution sensor	36.4MP	Sony E	25,600	1080p	•	25	4	•	•			•	•	•	340	127	94	48	465g	
Sony Alpha 7R II	£2599	5★	A big step up from the A7R; one of the best full-frame cameras available	42.4MP	Sony E	102,400	3840p	•	399	5	•	•			•	•	•	290	126.9	95.7	60.3	625g	
Sony Alpha 7S	£2259	4★	Remarkable low-light and video capabilities	12.2MP	Sony E	409,600	1080p	•	25	5	•	•			•	•	•	380	126.9	94.4	48.2	489g	
Sony Alpha 7S II	£2500	5★	A specialist camera for low light shooting and 4K video	12.2MP	Sony E	409,600	3840p	•	169	5	•	•	•		•	•	•	310	126.9	95.7	60.3	627g	



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Lenses

Interchangeable lenses come in a huge array of types for shooting different kinds of subjects

FOR MOST ENTHUSIAST photographers, the easiest way to expand the kinds of pictures you can take is by buying different types of lenses. For example, telephoto lenses let you zoom in on distant subjects, while macro lenses allow you to focus on small subjects. Large-aperture lenses allow you to isolate subjects against blurred backgrounds or shoot in low light without having to raise the ISO too high. Meanwhile, all-in-one superzooms cover a wide range of subjects, but with lower optical quality.



Lens mounts
Each manufacturer has its own lens mount and most aren't compatible with one another. For example, a Canon DSLR can't use Nikon lenses, though you can use independent brands if you get them with the right mount.

Built-in focus motor
Most lenses now incorporate an internal motor to drive the autofocus, although some are still driven from the camera body. DSLR lenses often use ultrasonic-type motors for fast focusing, while those for mirrorless cameras tend to employ video-friendly stepper motors.

Filter thread
A thread at the front of the camera will have a diameter, in mm, which will allow you to attach a variety of filters or adapters to the lens.

Maximum aperture
Wider apertures mean you can use faster, motion-stopping shutter speeds.

LENS SUFFIX GUIDE USED BY MANUFACTURERS

AF Nikon AF lenses driven from camera	DC Nikon defocus-control portrait lenses	ED Extra-low Dispersion elements	LD Low-Dispersion glass	SP Tamron's Super Performance range
AF-S Nikon lenses with Silent Wave Motor	DC Sigma's lenses for APS-C digital	EF Canon's DSLR lenses for full frame	LM Fujifilm Linear Motor	SSM Sony Supersonic Motor lenses
AF-P Nikon lenses with stepper motors	DG Sigma's designation for full-frame lenses	EF-S Canon lenses for APS-C sized sensors	MP-E Canon's high-magnification macro lens	STF Sony and Laowa Smooth Trans Focus
AL Pentax lenses with aspheric elements	Di Tamron lenses for full-frame sensors	EF-M Canon's lenses for its mirrorless M range	OIS Optical Image Stabilisation	STM Canon lenses with stepper motor
APD Fujifilm lenses with apodisation elements	Di-II Tamron lenses designed for APS-C DSLRs	EX Sigma's 'Excellent' range	OS Sigma's Optically Stabilised lenses	TS-E Canon Tilt-and-Shift lens
APO Sigma Apochromatic lenses	Di-III Tamron lenses for mirrorless cameras	FA Pentax full-frame lenses	PC-E Nikon tilt-and-shift lenses	UMC Ultra Multi Coated
ASPH Aspherical elements	DN Sigma's lenses for mirrorless cameras	FE Sony lenses for full-frame mirrorless	PF Nikon Phase Fresnel optics	USD Canon lenses with an Ultrasonic Motor
AT-X Tokina's Advanced Technology Extra Pro	DO Canon diffractive optical element lenses	G Nikon lenses without an aperture ring	PRO Tokina and Olympus Professional lenses	USD Tamron Ultrasonic Drive motor
AW Pentax all-weather lenses	DT Sony lenses for APS-C sized sensors	HSM Sigma's Hypersonic Motor	PZD Tamron Piezo Drive focus motor	VC Tamron's Vibration Compensation
CS Samyang lenses for APS-C cropped sensors	DX Nikon's lenses for DX-format digital	IF Internal Focusing	SAM Sony Smooth Autofocus Motor	VR Nikon's Vibration Reduction feature
D Nikon lenses that communicate distance info	E Nikon lenses with electronic apertures	IS Canon's Image-Stabilised lenses	SDM Pentax's Sonic Direct Drive Motor	XR Tamron Extra Refractive Index glass
DA Pentax lenses optimised for APS-C sized sensors	E Sony lenses for APS-C mirrorless	L Canon's 'Luxury' range of lenses	SMC Pentax Super Multi Coating	WR Weather Resistant

DSLR Lenses

DSLR Lenses

LENS	RRP	SCORE	SUMMARY	IMAGE STABILISATION	SONY ALPHA	CANON	FOUR THIRDS	NIKON	PENTAX	SIGMA	FULL FRAME	MIN FOCUS (CM)	FILTER THREAD (MM)	WIDTH (MM)	LENGTH (MM)	WEIGHT
CANON DSLR																
EF 8-15mm f/4 L USM	£1499		Impressive-looking fisheye zoom lens from Canon			•					•	15	n/a	78.5	83	540g
EF-S 10-18mm f/4.5-5.6 IS STM	£299	4★	A superb ultra wideangle that's a must-have for anyone shooting landscapes and cityscapes	•		•						22	67	74.6	72	240g
EF-S 10-22mm f/3.5-4.5 USM	£990	4★	A good performer, with solid MTF curves and minimal chromatic aberration			•						24	77	83.5	89.8	385g
EF 11-24mm f/4 L USM	£2799		Long-awaited by Canon full-frame users, this is the world's widest-angle rectilinear zoom lens			•					•	28	n/a	108	132	1180g
EF 14mm f/2.8 L II USM	£2810	4.5★	Impressive resolution at f/8 but less so wide open			•					•	20	n/a	80	94	645g
EF-S 15-85mm f/3.5-5.6 IS USM	£900	4★	Four-stop image stabilisation and Super Spectra coatings, together with a useful range	•		•						35	72	81.6	87.5	575g
EF 16-35mm f/2.8 L II USM	£1790	4.5★	A good performer with strong results at f/8 in particular			•					•	28	82	88.5	111.6	635g
EF 16-35mm f/2.8 L III USM	£2150		Revamped wideangle zoom includes new optics in a weather-sealed lens barrel			•					•	28	82	89.5	127.5	790g
EF 16-35mm f/4 L IS USM	£1199	4★	Versatile and with a useful IS system, this is a very good ultra-wideangle zoom for full-frame cameras	•		•					•	28	77	82.6	112.8	615g
TS-E 17mm f/4 L	£2920		Tilt-and-shift optic with independent tilt-and-shift rotation and redesigned coatings			•					•	25	77	88.9	106.9	820g
EF 17-40mm f/4 L USM	£940	4★	Designed to match the needs of demanding professionals – and does so with ease			•					•	28	77	83.5	96.8	500g
EF-S 17-55mm f/2.8 IS USM	£795	4★	Very capable lens with three-stop image stabilisation, Super Spectra coating and a circular aperture	•		•						35	77	83.5	110.6	645g
EF-S 17-85mm f/4-5.6 IS USM	£600	3★	Doesn't really live up to its promises. The zoom range is excellent but there are better alternatives	•		•						35	67	78.5	92	475g
EF-S 18-55mm f/3.5-5.6 IS STM	£195		Versatile, affordable standard zoom featuring four-stop image stabilisation	•		•						25	58	69	75.2	205g
EF-S 18-55mm f/3.5-5.6 IS II	£220	3.5★	Given the low price of this zoom, its results are very impressive	•		•						25	58	68.5	70	200g
EF-S 18-135mm f/3.5-5.6 IS	£500		Four-stop image stabilisation, and automatic panning and tripod detection	•		•						45	67	75.4	101	455g
EF-S 18-135mm f/3.5-5.6 IS STM	£478		Uses stepper motor for silent and fast autofocus that's also well-suited to video work	•		•						39	67	76.6	96	480g
EF-S 18-135mm f/3.5-5.6 IS USM	£500		Versatile wideangle zoom with new Nano USM focus technology	•		•						39	67	77.4	96	515g
EF-S 18-200mm f/3.5-5.6 IS	£740	4★	Automatic panning detection (for image stabilisation) and a useful 11x zoom range	•		•						45	72	78.6	102	595g
EF 20mm f/2.8 USM	£610		Wideangle lens with a floating rear-focusing system and a USM motor			•					•	25	72	77.5	70.6	405g
EF 24mm f/1.4 L II USM	£2010		Subwavelength structure coating, together with UD and aspherical elements			•					•	25	77	83.5	86.9	650g
EF 24mm f/2.8 IS USM	£750	4★	Small wideangle optic with image stabilisation	•		•					•	20	58	68.4	55.7	280g
EF-S 24mm f/2.8 STM	£165	4★	Bargain price, tiny carry-everywhere size and a highly competent imaging performance			•						16	52	68.2	22.8	125g

ALL PRICES ARE RRP'S. STREET PRICES MAY VARY

DSLR Lenses

				IMAGE STABILISATION	SONY ALPHA	CANON	FOUR THIRDS	NIKON	PENTAX	SIGMA	FULL FRAME	MIN FOCUS (CM)	FILTER THREAD (MM)	WIDTH (MM)	LENGTH (MM)	WEIGHT
LENS	RRP	SCORE	SUMMARY		MOUNT							DIMENSIONS				
TS-E 24mm f/3.5 L II	£2550		Tilt-and-shift optic with independent tilt-and-shift rotation and redesigned coatings			•					•	21	82	88.5	106.9	780g
EF 24-70mm f/2.8 L II USM	£2300	5★	Professional-quality standard zoom lens with a fast aperture			•					•	38	82	88.5	113	805g
EF 24-70mm f/4 L IS USM	£1499		L-series zoom said to be compact, portable and aimed at both professionals and amateurs		•	•					•	38	77	83.4	93	600g
EF 24-105mm f/4 L IS USM	£1049	4.5★	An excellent all-round performer, and keenly priced, too		•	•					•	45	77	83.5	107	670g
EF 24-105mm f/4 L IS II USM	£1129		Reworked workhorse zoom for full-frame cameras uses an all-new optical design		•	•					•	45	77	83.5	118	795g
EF 24-105mm f/3.5-5.6 IS STM	£479		A versatile standard zoom lens that's an ideal route into full-frame photography		•	•					•	40	77	83.4	104	525g
EF 28mm f/1.8 USM	£570		USM motor and an aspherical element, together with a wide maximum aperture			•					•	25	58	73.6	55.6	310g
EF 28mm f/2.8 IS USM	£730	3.5★	Lightweight and inexpensive lens, with a single aspherical element		•	•					•	30	52	67.4	42.5	185g
EF 28-300mm f/3.5-5.6 L IS USM	£3290		L-series optic with expansive range, image stabilisation and a circular aperture		•	•					•	70	77	92	184	1670g
EF 35mm f/2 IS USM	£799		First 35mm prime from Canon to feature an optical stabilisation system		•	•					•	24	67	62.6	77.9	335g
EF 35mm f/1.4 L II USM	£1799	5★	An outstanding addition to the L-series line-up			•					•	28	72	80.4	104.4	760g
EF 40mm f/2.8 STM	£230		A portable and versatile compact pancake lens. A fast maximum aperture enables low-light shooting			•					30	52	68.2	22.8	130g	
TS-E 45mm f/2.8	£1200		Tilt-and-shift lens designed for studio product photography			•					•	40	72	81	90.1	645g
EF 50mm f/1.2 L USM	£1910		Very wide maximum aperture and Super Spectra coatings, and a circular aperture			•					•	45	72	85.8	65.5	580g
EF 50mm f/1.4 USM	£450	5★	Brilliant performer, with a highly consistent set of MTF curves. AF motor is a tad noisy, though			•					•	45	58	73.8	50.5	290g
EF 50mm f/1.8 STM	£130	5★	Lightest EF lens in the range, with wide maximum aperture and a Micro Motor			•					•	35	49	69.2	39.3	130g
EF 50mm f/2.5 Macro	£350		Compact macro lens with floating system			•					•	23	52	67.6	63	280g
EF-S 55-250mm f/4-5.6 IS STM	£265		A compact telephoto lens featuring smooth, quiet STM focusing when shooting movies		•	•					110	58	70	111.2	375g	
EF-S 55-250mm f/4-5.6 IS II	£330	4★	Ideal budget addition to the 18-55mm kit lens, with image stabilisation and USM		•	•					110	58	70	108	390g	
EF-S 60mm f/2.8 Macro USM	£540	4★	Great build and optical quality, with fast, accurate and near-silent focusing			•					20	52	73	69.8	335g	
MP-E65mm f/2.8 1-5x Macro	£1250		Macro lens designed to achieve a magnification greater than 1x without accessories			•					•	24	58	81	98	710g
EF 70-200mm f/2.8 L USM	£1540		Non-stabilised L-series optic, with rear focusing and four UD elements			•					•	150	77	84.6	193.6	1310g
EF 70-200mm f/2.8 L IS II USM	£2800	5★	A great lens but also a costly one. Peak resolution at 0.4 cycles-per-pixel is simply amazing		•	•					•	120	77	88.8	199	1490g
EF 70-200mm f/4 L USM	£790		A cheaper L-series alternative to the f/2.8 versions available			•					•	120	67	76	172	705g
EF 70-200mm f/4 L IS USM	£1450	5★	A superb option for the serious sports and action photographer		•	•					•	120	67	76	172	760g
EF 70-300mm f/4.5-5.6 IS USM	£470	4★	A great level of sharpness and only the small apertures should be avoided		•	•					•	150	58	76	143	630g
EF 70-300mm f/4.5-5.6 IS II USM	£499		Updated mid-range telephoto zoom with new optics and much-improved autofocus		•	•					•	120	67	80	145.5	710g
EF 70-300mm f/4-5.6 L IS USM	£1600	5★	An L-series lens with a highly durable outer shell		•	•					•	120	67	89	143	1050g
EF 70-300mm f/4.5-5.6 DO IS USM	£1700		Three-layer diffractive optical element and image stabilisation		•	•					•	140	58	82.4	99.9	720g
EF 75-300mm f/4-5.6 III	£300		Essentially the same lens as the 75-300mm f/4.0-5.6 III USM but with no USM			•					•	150	58	71	122	480g
EF 75-300mm f/4-5.6 III USM	£350	2.5★	Good but not outstanding. The inclusion of a metal lens mount is positive, though			•					•	150	58	71	122	480g
EF 85mm f/1.2 L II USM	£2640	4★	A well-crafted lens, with fast and quiet AF with good vignetting and distortion control			•					•	95	72	91.5	84.0	1025g
EF 85mm f/1.8 USM	£470	5★	Non-rotating front ring thanks to rear-focusing system, as well as USM			•					•	85	58	75	71.5	425g
TS-E 90mm f/2.8	£1670		Said to be the world's first 35mm-format telephoto lens with tilt-and-shift movements			•					•	50	58	73.6	88	565g
EF 100mm f/2 USM	£559		A medium telephoto lens with a wide aperture, making it ideal for portraits			•					•	90	58	75	73.5	460g
EF 100mm f/2.8 Macro USM	£650	4★	A solid performer, but weak at f/2.8 (which is potentially good for portraits)			•					•	31	58	79	119	600g
EF 100mm f/2.8 L Macro IS USM	£1060	5★	Stunning MTF figures from this pro-grade macro optic		•	•					•	30	67	77.7	123	625g
EF 100-400mm f/4.5-5.6 L IS II USM	£1999	4.5★	L-series construction and optics, including fluorite and Super UD elements		•	•					•	98	77	94	193	1640g
EF 135mm f/2 L USM	£1360		L-series construction with two UD elements and wide maximum aperture			•					•	90	72	82.5	112	750g
EF 180mm f/3.5 L Macro USM	£1870		L-series macro lens with inner focusing system and USM technology			•					•	48	72	82.5	186.6	1090g
EF 200mm f/2 L IS USM	£7350		Five-stop image stabilisation with tripod detection and Super Spectra lens coatings		•	•					•	190	52	128	208	2520g
EF 200mm f/2.8 L II USM	£960		Two UD elements and a rear-focusing system in this L-series optic			•					•	150	72	83.2	136.2	765g
EF 300mm f/2.8 L IS II USM	£7500		Four-stop image stabilisation makes this lens perfect for action photography		•	•					•	200	52	128	248	2400g
EF 300mm f/4 L IS USM	£1740		Two-stop image stabilisation with separate mode for panning moving subjects		•	•					•	150	77	90	221	1190g
EF 400mm f/2.8 L IS II USM	£9810		Super telephoto with ring-type USM and four-stop image stabilisation		•	•					•	270	52	163	343	3850g
EF 400mm f/4 DO IS II USM	£8000		Multi-layer diffractive optical element to correct for chromatic aberration		•	•					•	330	52	128	232.7	2100g
EF 400mm f/5.6 L USM	£1660		Super UD and UD elements, as well as a detachable tripod mount and built-in hood			•					•	350	77	90	256.5	1250g
EF 500mm f/4 L IS II USM	£5299		Full-time manual focus, a single flourite element and dust and moisture protection		•	•					•	450	52	146	387	3870g

NIKON DSLR

10.5mm f/2.8 G ED DX Fisheye	£678		DX format fisheye lens with Nikon's Close-Range Correction system and ED glass					•				14	n/a	63	62.5	300g
10-24mm f/3.5-4.5 G ED AF-S DX	£834	4★	MTF performance is good from wide open to f/11, only breaking down past f/22					•				24	77	82.5	87	460g
12-24mm f/4 G ED AF-S DX	£1044	4★	This venerable optic may be a little weak at f/4, but otherwise it's a good performer					•				30	77	82.5	90	485g
14mm f/2.8 D ED AF	£1554	5★	A really nice lens that handles well and offers excellent image quality					•			•	20	n/a	87	86.5	670g
14-24mm f/2.8 G ED AF-S	£1670	5★	A remarkable piece of kit, producing sharp images with little chromatic aberration					•			•	28	n/a	98	131.5	970g
16mm f/2.8 D AF Fisheye	£762		Full-frame fisheye lens with Close-Range Correction system and 25cm focus distance					•			•	25	n/a	63	57	290g
16-35mm f/4 G ED AF-S VR	£1072	5★	A fantastic lens that deserves to be taken seriously, with very little CA throughout		•			•			•	28	77	82.5	125	685g
16-80mm f/2.8-4E ED VR AF-S DX	£869	4★	This new standard zoom for DX-format users is designed as a travel lens for APS-C DSLRs		•			•			35	72	80	85.5	480g	
16-85mm f/3.5-5.6 G ED VR AF-S DX	£574	4★	Boasting Nikon's second-generation VR II technology and Super Integrated Coating		•			•			38	67	72	85	485g	
17-55mm f/2.8 G ED-IF AF-S DX	£1356	4★	A higher-quality standard zoom for DX-format DSLRs					•			36	77	85.5	110.5	755g	
18-35mm f/3.5-4.5 G ED AF-S	£669	5★	Wideangle zoom with instant manual-focus override for full-frame DSLRs					•		•	28	77	83	95	385g	
18-55mm f/3.5-5.6 G II AF-S DX	£156	3.5★	Entry-level standard zoom lens					•			28	52	73	79.5	265g	
18-55mm f/3.5-5.6 G VR II AF-S DX	£229		Popular 3x zoom lens that is remarkably compact and lightweight, offering great portability		•			•			28	52	66	59.5	195g	
18-55mm f/3.5-5.6 G AF-P DX	£149		A compact, lightweight DX-format zoom that's an ideal walk-around lens					•			25	55	64.5	62.5	195g	
18-55mm f/3.5-5.6 G VR AF-P DX	£199		A compact, lightweight DX-format zoom lens with Vibration Reduction		•			•			25	55	64.5	62.5	205g	
18-105mm f/3.5-5.6 G ED VR AF-S DX	£292	4.5★	Kit lens for Nikon D90 & D7000 with Silent Wave Motor and Vibration Reduction		•			•			n/a	67	76	89	420g	
18-140mm f/3.5-5.6 G ED VR AF-S DX	£579		A compact and lightweight DX-format zoom, this lens is a great all-rounder		•			•			45	67	78	97	490g	
18-200mm f/3.5-5.6 G IF-ED VR II AF-S VR DX	£762	4.5★	Four-stop VR II system, two ED and three aspherical elements in this DX superzoom lens		•			•			50	72	77	96.5	560g	
18-300mm f/3.5-5.6 G ED-IF VR	£850	4★	DX-format zoom lens with wideangle to super-telephoto reach		•			•			45	77	83	120	830g	

DSLR Lenses

DSLR Lenses

LENS	RRP	SCORE	SUMMARY		IMAGE	SONY ALPHA	CANON	FOUR THIRDS	NIKON	PENTAX	SIGMA	FULL FRAME	MIN FOCUS (CM)	FILTER THREAD (MM)	WIDTH (MM)	LENGTH (MM)	WEIGHT
					STABILISATION												
18-300mm f/3.5-6.3 G ED VR	£849		New DX-format 16.7x zoom with super-telephoto reach – a compact ‘walkabout’ lens	•					•				48	67	78.5	99	550g
19mm f/4E ED PC	£3300		Super-wideangle tilt-and-shift lens for architecture and landscape photography						•			•	25	n/a	89	124	885g
20mm f/1.8 G ED AF-S	£679		A fast FX-format prime lens that’s compact and lightweight						•			•	20	77	82.5	80.5	335g
20mm f/2.8 D AF	£584		Compact wideangle lens with Nikon’s Close-Range Correction system						•			•	25	62	69	42.5	270g
24mm f/2.8 D AF	£427		Compact wide lens with Close-Range Correction system						•			•	30	52	64.5	46	270g
24mm f/1.4 G ED AF-S	£1990	5★	Nothing short of stunning. Aside from its high price, there is very little to dislike about this optic						•			•	25	77	83	88.5	620g
24mm f/1.8 G ED AF-S	£629		Fast FX-format lens that aims to appeal to landscape, interior, architecture and street photographers						•				23	72	77.5	83	355g
24mm PC-E f/3.5 D ED PC-E	£1774		Perspective Control lens with Nano Crystal Coating and electronic control over aperture						•			•	21	77	82.5	108	730g
24-70mm f/2.8 G ED AF-S	£1565	5★	An excellent set of MTF curves that show outstanding consistency, easily justifying the price of this lens						•			•	38	77	83	133	900g
24-70mm f/2.8 E ED VR	£1849	5★	Nikon’s latest pro-spec standard zoom looks like its best lens yet	•					•			•	38	82	88	154.5	1070g
24-85mm f/3.5-4.5 G ED VR	£520	5★	FX-format standard zoom with Auto Tripod detection and VR	•					•				38	72	78	82	465g
24-120mm f/4 G ED AF-S VR	£1072	5★	Constant maximum aperture of f/4 and the addition of VR makes this a superb lens	•					•			•	45	77	84	103	710g
28mm f/1.8 G ED AF-S	£619	5★	If you crave a wide aperture and prefer a single focal length then this Nikon prime delivers						•			•	25	67	73	80	330g
28mm f/2.8 D AF	£282		Compact wideangle lens with a minimum focusing distance of 25cm						•			•	25	52	65	44.5	205g
28-300mm f/3.5-5.6 G ED AF-S VR	£889	4.5★	Technical testing shows this zoom to be, as Nikon claims, the ‘ideal walkabout lens’	•					•			•	50	77	83	114	800g
35mm f/1.8 G AF-S DX	£208	5★	Designed for DX-format DSLRs, a great standard prime lens						•				30	52	70	52.5	200g
35mm f/1.8 G ED AF-S	£479		Fast FX-format prime lens with bright f/1.8 aperture. Versatile and lightweight						•			•	25	58	72	71.5	305g
35mm f/2 D AF	£324	3★	At wide-aperture settings this optic achieves respectable resolution, which decreases with aperture						•			•	25	52	64.5	43.5	205g
35mm f/1.4 G ED AF-S	£1735	5★	A Nano Crystal-coated lens designed for the FX range						•			•	30	67	83	89.5	600g
40mm f/2.8 G AF-S DX Micro	£250	5★	A budget-priced macro lens that delivers the goods on multiple fronts						•				20	52	68.5	64.5	235g
45mm PC-E f/2.8 D ED Micro	£1393		Perspective Control (PC-E) standard lens used in specialised fields such as studio and architecture						•			•	25	77	82.5	112	740g
50mm f/1.4 D AF	£292	5★	Entry-level prime puts in a fine performance while offering backwards compatibility with AI cameras						•			•	45	52	64.5	42.5	230g
50mm f/1.4 G AF-S	£376	5★	Internal focusing and superior AF drive makes this a good alternative to the D-series 50mm f/1.4	•					•			•	45	58	73.5	54	280g
50mm f/1.8 D AF	£135		Compact, lightweight, affordable prime, will stop down to f/22						•			•	45	52	63	39	160g
50mm f/1.8 G AF-S	£200	5★	A cut-price standard lens for FX shooters or a short telephoto on DX-format DSLRs						•			•	45	58	72	52.5	185g
55mm f/2.8 Micro	£625		Macro lens with 1/2 maximum reproduction ratio						•			•	25	52	63.5	62	290g
55-200mm f/4-5.6 G VR AF-S DX	£314	3.5★	Designed for DX-format cameras, with Vibration Reduction and SWM technology	•					•				110	52	73	99.5	335g
55-200mm f/4-5.6 G VR II AF-S DX	£251		Offers a versatile focal range and an ultra-compact design, perfect for smaller DX-format DSLRs	•					•				110	52	70.5	83	300g
55-300mm f/4.5-5.6 G VR AF-S DX	£378	3★	Offers a wide telephoto coverage, but better options available	•					•				140	58	76.5	123	530g
58mm f/1.4 G AF-S	£1599	4★	FX-format full-frame premium prime lens with large f/1.4 aperture						•			•	58	72	85	70	385g
60mm f/2.8 D AF Micro	£405	5★	Nikon’s most compact Micro lens, with Close Range Correction (CRC) system						•			•	22	62	70	74.5	440g
60mm f/2.8 G ED AF-S Micro	£500		Micro lens with 1:1 repro ratio, as well as a Silent Wave Motor and Super ED glass						•			•	18	62	73	89	425g
70-200mm f/2.8 G ED VR II AF-S	£2085	5★	Very little to fault here, with stunning image quality and consistent results at different focal lengths	•					•			•	140	77	87	209	1540g
70-200mm f/2.8 E FL ED VR AF-S	£2650		Latest update to Nikon’s pro workhorse fast telephoto zoom brings electronic aperture control	•					•			•	110	77	88.5	202.5	1430g
70-200mm f/4 G ED VR	£1180	5★	Latest 70-200mm offers third-generation VR and weight savings over its more expensive f/2.8 cousin	•					•			•	1000	67	78	178.5	850g
70-300mm f/4.5-5.6 G ED AF-S VR	£556	4★	Feature-packed optic, with a VR II system, 9-bladed diaphragm, SWM and ED glass	•					•			•	n/a	67	80	143.5	745g
70-300mm f/4.5-6.3G AF-P DX	£300		Budget telephoto zoom with stepper motor for AF and space-saving collapsible design						•				110	58	72	125	400g
70-300mm f/4.5-6.3G AF-P DX VR	£350		Adds extremely useful optical stabilisation to Nikon’s budget compact telephoto	•					•				110	58	72	125	415g
80-400mm f/4.5-5.6 G ED VR AF-S	£1899	5★	Successor to the 80-400mm f/4.5-5.6D ED VR, focusing is excellent at tracking fast-moving subjects	•					•			•	175	77	95.5	203	1570g
85mm f/3.5 G ED AF-S DX VR	£522		DX-format Micro lens with a 1:1 reproduction ratio, VR II system and ED glass	•					•				28	52	73	98.5	355g
85mm f/1.4 G AF-S	£1532	5★	Fast mid-tele lens with an internal focusing system and rounded diaphragm						•			•	85	77	86.5	84	595g
85mm f/1.8 D	£385		Portable medium telephoto – ideal for portraits						•			•	85	62	71.5	58.5	380g
85mm f/1.8 G AF-S	£470	5★	Rear-focusing system and distance window in this medium telephoto lens						•			•	80	67	80	73	350g
85mm f/2.8D PC-E Micro	£1299		Perspective Control (PC-E) telephoto, designed to be ideal for portraits and product photography						•			•	39	77	83.5	107	635g
105mm f/1.4 E ED AF-S	£2049		A 105mm FX-format prime lens with bright f/1.4 aperture, ideal for portraiture						•			•	100	82	94.5	106	985g
105mm f/2.8 G AF-S VR II Micro	£782	4.5★	A very sharp lens, with swift and quiet focusing and consistent MFT results	•					•			•	31	62	83	116	720g
105mm f/2 D AF DC	£980		A portrait lens with defocus control						•			•	90	n/a	79	111	640g
135mm f/2 D AF DC	£1232		Defocus-Image Control and a rounded diaphragm in this telephoto optic						•			•	110	n/a	79	120	815g
180mm f/2.8 D ED-IF AF	£782		Useful telephoto length and internal focusing technology, together with ED glass						•			•	150	72	78.5	144	760g
200mm f/4 D ED-IF AF Micro	£1429		1:1 reproduction range in this Micro lens, with a Close-Range Correction system						•			•	50	62	76	104.5	1190g
200mm f/2 G ED AF-S VR II	£5412		A full-frame lens offering ghost-reducing Nano Crystal coating	•					•			•	190	52	124	203	2930g
200-500mm f/5.6 E ED VR AF-S	£1179		A super-telephoto zoom lens compatible with Nikon FX-format DSLR cameras	•					•			•	220	95	108	267.5	2300g
300mm f/4 E PF ED VR AF-S	£1230	5★	Light, compact AF-S full-frame telephoto lens with ED glass elements	•					•			•	140	77	89	147.5	755g
300mm f/2.8 G ED AF-S VR II	£5209		This lens promises fast and quiet AF, and is fitted with Nikon’s latest VR II system	•					•			•	230	52	124	267.5	2900g

LAOWA DSLR

12mm f/2.8 Zero D	£TBC		Ultra-wideangle lens for full-frame DSLRs that promises minimal distortion		•	•		•	•		•	18	TBC	74.8	82.8	609g
15mm f/4 1:1 Macro	£449		Wideangle lens, with 1:1 Macro available in Canon, Nikon, Pentax, Sony E and Sony A		•	•		•	•		•	12	77	83.8	64.7	410g

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DSLR Lenses

LENS	RRP	SCORE	SUMMARY		IMAGE STABILISATION	SONY ALPHA	CANON	FOUR THIRDS	NIKON	PENTAX	SIGMA	FULL FRAME	MIN FOCUS (CM)	FILTER THREAD (MM)	WIDTH (MM)	LENGTH (MM)	WEIGHT
60mm f/2.8 2X Ultra-Macro	£319		With 2:1 Macro, an all-in-one option for normal portrait photography as well as ultra-macro			•	•		•	•		•	18.5	62	95	70	503g
105mm f/2 (T32) STF	£649	4★	Designed for full-frame DSLRS, and features an apodization element that renders lovely bokeh			•	•		•	•		•	90	67	98.9	76	745g

PENTAX DSLR

DA 10-17mm f/3.5-4.5 smc ED IF	£590		Fisheye zoom lens with Super Protection coating and Quick Shift manual focus							•			14	n/a	71.5	68	320g
DA 12-24mm f/4 smc ED AL IF	£1050		Two aspherical elements, ELD glass and a constant aperture of f/4 in this wide zoom							•			30	77	83.5	87.5	430g
DA 14mm f/2.8 smc ED IF	£730	4.5★	Best performance lies between f/5.6 and f/11, but good results can be had at f/4, too							•			17	77	83.5	69	420g
DA 15mm f/4 smc ED AL Limited	£820		Limited edition lens with hybrid aspherical and extra-low-dispersion elements							•			18	49	39.5	63	212g
FA 15-30mm f/2.8 ED SM WR HD	£1500		Weather-resistant ultra-wideangle zoom with fast maximum aperture and fixed petal-type hood							•		•	28	n/a	98.5	143.5	1040g
DA* 16-50mm f/2.8 smc ED AL IF SDM	£950	3.5★	A nice balance and robust feel, but poor sharpness at f/2.8 (which significantly improves from f/4 onwards)							•			30	77	98.5	84	600g
DA 16-85mm f/3.5-5.6 ED DC WR	£600		Weather-resistant, this zoom features a round-shaped diaphragm to produce beautiful bokeh							•			35	72	78	94	488g
DA 17-70mm f/4 smc AL IF SDM	£630		Featuring Pentax's Supersonic Direct-drive (SDM) focusing system							•			28	67	75	93.5	485g
DA 18-50mm f/4-5.6 DC WR RE	£230		Super-thin standard zoom that's weather-resistant and features a round-shaped diaphragm							•			30	58	71	41	158g
DA 18-55mm f/3.5-5.6 smc II ED AL IF	£220	3.5★	Something of a bargain. Only the maximum apertures and awkward manual focusing really let it down							•			25	52	68	67.5	220g
DA 18-55mm f/3.5-5.6 smc AL WR	£229		A weather-resistant construction and an aspherical element, as well as SP coating							•			25	52	68.5	67.5	230g
DA 18-135mm f/3.5-5.6 DA ED DC WR	£600	3.5★	A weather-resistant mid-range zoom lens							•			40	62	73	76	405g
DA 18-270mm f/3.5-6.3 smc ED SDM	£699		15x superzoom for company's K-mount DSLRs featuring two extra-low-dispersion (ED) elements							•			49	62	76	89	453g
DA 20-40mm f/2.8-4 ED Limited DC WR	£829		With state-of-the-art HD coating, a completely round-shaped diaphragm, and weather-resistant							•			28	55	68.5	71	283g
DA 21mm f/3.2 smc AL Limited	£600		This limited-edition optic offers a floating element for extra-close focusing							•			20	49	63	25	140g
FA 24-70mm f/2.8 ED SDM WR	£1149		Full-frame-compatible premium standard zoom – includes a HD coating to minimise flare and ghosting							•		•	38	82	109.5	88.5	787g
FA 28-105mm f/3.5-5.6 ED DC HD	£549		Standard zoom lens for the K-1 full-frame DSLR that's much more affordable than the 24-70mm f/2.8							•		•	50	62	73	86.5	440g
FA 31mm f/1.8 smc AL Limited	£1149		Aluminium body; when used on a Pentax DSLR offers a perspective similar to that of the human eye							•		•	30	58	68.5	65	345g
FA 35mm f/2 smc AL	£550		A compact wideangle lens that weighs a mere 214g							•		•	30	49	64	44.5	214g
DA 35mm f/2.8 smc Macro	£640	4.5★	Despite slight edge softness, this lens performs excellently and is a pleasure to use							•			14	49	46.5	63	215g
DA 35mm f/2.4 smc DS AL	£180	5★	A budget price prime lens for beginners							•			30	49	63	45	124g
DA 40mm f/2.8 smc Limited	£450		Pancake lens with SMC coating and Quick Shift focusing system							•			40	49	63	15	90g
DA 40mm XS f/2.8 XS	£325		The world's smallest fixed focal length lens							•			40	n/a	62.9	9	52g
FA 43mm f/1.9 smc Limited	£729		Focal length is ideal for portraits as well as everyday use, and features an SMC multi-layer coating							•		•	45	49	27	64	155g
FA 50mm f/1.4 smc	£399		High-quality fast prime. The 'FA' indicates that its image circle covers the 35mm full-frame format							•		•	45	49	63.5	38	220g
DA 50mm f/1.8 smc DA	£249	4★	Affordable short telephoto lens ideal for portraits							•			45	52	38.5	63	122g
DFA 50mm f/2.8 smc Macro	£550		Macro lens capable of 1:1 reproduction and with a Quick Shift focus mechanism							•		•	19	49	60	67.5	265g
DA* 50-135mm f/2.8 smc ED IF SDM	£1200	4★	Constant f/2.8 aperture; well suited to portraiture and mid-range action subjects							•			100	67	76.5	136	765g
DA 50-200mm f/4-5.6 smc ED WR	£210		Weather-resistant construction, Quick Shift focus system and an SP coating							•			n/a	49	69	79.5	285g
DA* 55mm f/1.4 smc SDM	£800	4.5★	Even despite questions about the particular sample tested, this lens scores highly							•			45	58	70.5	66	375g
DA 55-300mm f/4.5-6.3 ED PLM WR RE	£400		Compact weather resistant telephoto zoom has video-friendly fast and silent autofocus motor							•			95	58	76.5	89	442g
DA 55-300mm f/4-5.8 smc ED	£370	4★	The lens boasts a useful focal range, as well as a dirt-resistant SP coating							•			140	58	75	111.5	440g
DA 55-300mm f/4-5.8 ED WR	£399		Weatherproof HD telephoto lens featuring quick shift focusing system							•			140	58	71	111.5	466g
DA 60-250mm f/4 smc ED IF SDM	£1450	4.5★	With a constant f/4 aperture and an ultrasonic motor for speedy focusing							•			110	67	167.5	82	1040g
DA 70mm f/2.4 smc AL Limited	£600		Medium telephoto lens with an aluminium construction and a Super Protect coating							•			70	49	63	26	130g
D-FA* 70-200mm f/2.8 ED DC AW	£1850		New addition to Pentax's high-performance Star (*) series developed for best image rendition							•		•	120	77	91.5	203	1755g
FA 77mm f/1.8 smc Limited	£1050		With Pentax's Fixed Rear Element Extension focusing system for 'sharp, crisp images'							•		•	70	49	48	64	270g
D-FA 100mm f/2.8 Macro	£700		Designed for both digital and film cameras, this macro lens boasts a 1:1 repro ratio							•		•	30	49	67.5	80.5	345g
D-FA 100mm f/2.8 Macro WR	£680	5★	Street price makes this something of a bargain for a true macro offering full-frame coverage							•		•	30	49	65	80.5	340g
FA 150-450mm f/4.5-5.6 ED DC AW	£2000		Super-telephoto lens with weather resistance, designed to produce extra-sharp, high-contrast images							•		•	200	86	241.5	95	2000g
DA* 200mm f/2.8 smc ED IF SDM	£1000	4.5★	SDM focusing system on the inside, and dirtproof and splashproof on the outside							•			120	77	83	134	825g
DA* 300mm f/4 smc ED IF SDM	£1300		This tele optic promises ultrasonic focus and high image quality thanks to ED glass							•			140	77	83	184	1070g

SAMYANG DSLR

8mm f/3.5 UMC Fisheye CS II	£274		Wideangle fisheye lens designed for digital reflex cameras with APS-C sensors			•	•	•	•	•			30	n/a	75	77.8	417g
10mm f/2.8 ED AS NCS CS	£429		Features a nano crystal anti-reflection coating system and embedded lens hood			•	•	•	•	•			24	n/a	86	77	580g
12mm f/2.8 ED AS NCS Fisheye	£430		Fisheye ultra wideangle prime lens for full-frame DSLRs			•	•	•	•	•		•	20	n/a	77.3	70.2	500g
14mm f/2.8 ED UMC	£279		Ultra-wideangle manual-focus lens; bulb-like front element means no filters can be used			•	•	•	•	•		•	28	n/a	94	87	552g
14mm f/2.4 Premium MF	£899		High-end ultra-wideangle prime with premium optics and large maximum aperture			•						•	28	n/a	95	109.4	791g
16mm f/2.0 ED AS UMC CS	£389		Fast wideangle lens for digital reflex cameras fitted with APS-C sensors			•	•	•	•	•			20	n/a	89.4	83	583g
20mm f/1.8 ED AS UMC	£430		Large-aperture manual focus wideangle lens for full-frame DSLRs			•	•	•	•	•		•	20	77	83	113.2	520g
24mm f/1.4 AS UMC	£499		Fast ultra-wideangle manual-focus lens comprising 13 elements arranged in 12 groups			•	•	•	•	•		•	25	77	95	116	680g
24mm f/3.5 ED AS UMS TS	£949	3★	Tilt-and-shift wideangle lens for a fraction of the price of Canon and Nikon's offerings			•	•	•	•	•		•	20	82	86	110.5	680g
35mm f/1.4 AS UMC	£369	4.5★	While manual focus only, this prime impressed us in real-world use, making it something of a bargain			•	•	•	•	•		•	30	77	83	111	660g

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DSLR Lenses

DSLR Lenses

																	IMAGE STABILISATION	SONY ALPHA	CANON	FOUR THIRDS	NIKON	PENTAX	SIGMA	FULL FRAME	MIN FOCUS (CM)	FILTER THREAD (MM)	WIDTH (MM)	LENGTH (MM)	WEIGHT
LENS	RRP	SCORE	SUMMARY												MOUNT								DIMENSIONS						
50mm f/1.4 AS UMC	£299		Manual-focus fast standard prime for full-frame DSLRs												•	•	•	•	•	•	45	77	74.7	81.6	575g				
85mm f/1.2 Premium MF	£899		High-end manual focus lens sports an impressively fast maximum aperture													•				•	80	86	93	98.4	1050g				
85mm f/1.4 IF MC	£239		Short fast telephoto prime, manual focus, aimed at portrait photographers												•	•	•	•	•	•	100	72	78	72.2	513g				
100mm f/2.8 ED UMC Macro	£389		Full-frame compatible, the Samyang 100mm is a close-up true Macro lens												•	•	•	•	•	•	30	67	72.5	123.1	720g				
135mm f/2 ED UMC	£399		Manual focus portrait prime has fast aperture for subject isolation and background blur												•	•	•	•	•	•	80	77	82	122	830g				

SIGMA DSLR																	
4.5mm f/2.8 EX DC HSM	£739		Circular fisheye lens designed for digital, with SLD glass and a gelatin filter holder			•		•		•			13	n/a	76	77.8	470g
8mm f/3.5 EX DG	£799		The world's only 8mm lens equipped with autofocus also boasts SLD glass			•		•		•	•		13	n/a	73.5	68.6	400g
8-16mm f/4.5-5.6 DC HSM	£800	4★	Excellent performance at 8mm, which sadly drops at the 16mm end			•	•		•	•	•		24	72	75	105.7	555g
10mm f/2.8 EX DC	£599		A Hyper Sonic Motor (HSM) and built-in hood feature in this diagonal fisheye lens			•		•		•			13	n/a	75.8	83	475g
10-20mm f/3.5 EX DC HSM	£650	5★	An absolute gem of a lens that deserves a place on every photographer's wish list			•	•		•	•	•		24	82	87.3	88.2	520g
10-20mm f/4-5.6 EX DC HSM	£550	5★	A fine all-rounder, thanks to MTF curves that stay above 0.25 cycles-per-pixel down to f/16			•	•		•	•	•		24	77	83.5	81	470g
12-24mm f/4 DG HSM Art	£1649		Premium full-frame wideangle zoom designed to have minimal distortion in its wideangle imagery				•		•		•	•	24	n/a	101	132	1150g
12-24mm f/4.5-5.6 EX DG HSM	£868	4★	A tightly matched set of MTF curves, but APS-C users are advised to look at the 10-20mm instead			•	•		•	•	•	•	28	n/a	87	102.5	600g
15mm f/2.8 EX DG	£629	4★	This fisheye optic puts in a very solid performance – not to be dismissed as a gimmick!			•	•		•	•	•	•	15	n/a	73.5	65	370g
17-50mm f/2.8 EX DC OS HSM	£689		FLD and aspherical elements, a constant f/2.8 aperture and Optical Stabilisation		•	•	•		•	•	•		28	77	83.5	92	565g
17-70mm f/2.8-4 DC Macro OS HSM	£449		Compact redesign of this well-received lens launches the 'Contemporary' range		•	•	•		•	•	•		22	72	79	82	470g
18-35mm f/1.8 DC HSM	£799	5★	Said to be the world's first constant f/1.8 zoom; DOF equivalent of constant f/2.7 on full frame				•		•		•		28	72	78	121	810g
18-200mm f/3.5-6.3 DC	£349	3★	Good CA control at 200mm but otherwise an average performer			•	•		•	•	•		45	62	70	78.1	405g
18-200mm f/3.5-6.3 DC OS	£449	4★	Excellent resolution and consistent performance, but control over CA could be a little better		•		•		•		•		45	45	79	100	610g
18-250mm f/3.5-6.3 DC OS HSM	£572	4.5★	A very capable set of MTF curves that only shows minor weakness at wide apertures		•	•	•		•	•	•		45	72	79	101	630g
18-250mm f/3.5-6.3 DC Macro OS HSM	£500		Ultra-compact 13.8x high zoom ratio lens designed exclusively for digital SLR cameras		•	•	•		•	•	•		35	62	73.5	88.6	470g
18-300mm f/3.5-6.3 DC Macro OS HSM	£499		Compact and portable high ratio zoom lens offering enhanced features to make it the ideal all-in-one lens			•	•		•	•	•		39	72	79	101.5	585g
20mm f/1.4 DG HSM A	£799	5★	An outstanding wideangle fixed-focal-length lens				•		•		•	•	27.6	n/a	90.7	129.8	950g
24mm f/1.4 DG HSM A	£799	5★	The latest addition to Sigma's 'Art' line of high-quality fast primes				•		•		•	•	25	77	85	90.2	665g
24-35mm f/2 DG HSM A	£949	5★	The world's first large-aperture full-frame zoom offering a wide aperture of f/2 throughout the zoom range				•		•		•	•	28	82	87.6	122.7	940g
24-70mm f/2.8 EX DG IF HSM	£899	5★	Not perfect, but an excellent alternative to Canon and Nikon's 24-70mm lenses, with great MTF curves			•	•		•	•	•	•	38	82	88.6	94.7	790g
24-105mm f/4 DG OS HSM A	£849	4.5★	Serious full-frame alternative to own-brand lenses at a lower price, with no compromises in the build		•	•	•		•		•	•	45	82	89	109	885g
30mm f/1.4 EX DC HSM	£490	3★	A consistent performer, with slightly weaker but not unacceptable wide-open performance			•	•		•	•	•		40	62	76.6	59	430g
35mm f/1.4 DG HSM A	£799	5★	Large-aperture prime; first lens in company's 'Art' series			•	•		•	•	•	•	30	67	77	94	665g
50mm f/1.4 EX DC HSM	£459	5★	This lens may be priced above the norm, but it delivers results that are similarly elevated			•	•		•	•	•	•	45	77	84.5	68.2	505g
50mm f/1.4 DG HSM Art	£849	5★	This lens is a unique design that pays off in truly excellent image quality			•	•		•		•	•	40	77	85.4	100	815g
50-100mm f/1.8 DC HSM Art	£829	5★	This APS-C-format lens aims to cover the focal lengths of three prime lenses in one				•		•		•		37.4	82	93.5	170.7	1490g
50-500mm f/4.5-6.3 DG OS HSM	£1499	4★	A 10x zoom range, SLD elements and compatibility with 1.4x and 2x teleconverters		•	•	•		•	•	•	•	180	95	104.4	219	1970g
70-200mm f/2.8 EX DG OS HSM	£1539		Two FLD glass elements, said to have the same dispersive properties as fluorite		•	•	•		•	•	•	•	140	77	86.4	197	1430g
70-300mm f/4-5.6 APO DG Macro	£235		This tele-zoom lens has a 9-bladed diaphragm and two SLD elements			•	•		•	•	•	•	95	58	76.6	122	550g
70-300mm f/4-5.6 DG Macro	£170	3★	Generally unremarkable MTF curves, and particularly poor at 300mm			•	•		•	•	•	•	95	58	76.6	122	545g
85mm f/1.4 EX DG HSM	£890	5★	The Sigma's resolution from f/4 to f/8 is excellent			•	•		•	•	•	•	85	77	86.4	87.6	725g
85mm f/1.4 DG HSM Art	£1199		Billed as the ultimate portrait lens				•		•		•	•	85	86	95	126	tbc
105mm f/2.8 EX DG OS HSM Macro	£649	4.5★	An optically stabilised macro lens		•		•		•		•	•	31.2	62	78	126.4	725g
120-300mm f/2.8 DG HSM S	£3599		First lens in company's 'Sports' series; switch enables adjustment of both focus speed and focus limiter			•	•		•	•	•	•	150	105	124	291	3390g
150mm f/2.8 EX DG OS HSM Macro APO	£999		A macro lens offering image stabilisation		•		•		•		•	•	38	72	79.6	150	950g
150-500mm f/5-6.3 DG OS HSM	£999	3★	Significant softness at wide maximum apertures for all focal lengths		•	•	•		•	•	•	•	220	86	94.7	252	1780g
150-600mm f/5-6.3 DG OS HSM C	£1199		Budget 'Contemporary' version of Sigma's long-range telephoto zoom is smaller and lighter		•		•		•		•	•	280	95	105	260.1	1930g
150-600mm f/5-6.3 DG OS HSM S	£1599		This portable, high-performance telephoto zoom from Sigma's Sports line is dust and splashproof		•		•		•		•	•	260	105	121	290.2	2860g
180mm f/2.8 EX DG OS HSM Macro APO	£1499	5★	1:1 macro lens featuring three FLD glass elements and floating inner-focusing system		•	•	•		•		•	•	47	86	95	204	1640g
300mm f/2.8 APO EX DG HSM	£2899		Extra Low Dispersion (ELD) glass, multi-layer coatings and a Hyper Sonic Motor			•	•		•	•	•	•	250	46	119	214.5	2400g
500mm f/4.5 APO EX DG HSM	£4799		Telephoto lens with multi-layer coatings to 'optimise the characteristics of DSLRs'			•	•		•	•	•	•	400	46	123	350	3150g
500mm f/4 DG OS HSM S	£6000		Sigma's latest ultra-telephoto prime gives great results for a fraction of the price of its competitors		•		•		•		•	•	350	46	145	380	3310g

SONY DSLR																	
11-18mm f/4.5-5.6 DT	£609	3★	A solid overall performance that simply fails to be outstanding in any way			•							25	77	83	80.5	360g
16mm f/2.8 Fisheye	£709		Fisheye lens with a close focusing distance of 20cm and a 180° angle of view			•						•	20	n/a	75	66.5	400g
16-35mm f/2.8 ZA SSM T*	£1729	4.5★	High-end Zeiss wideangle zoom lens ideal for full-frame Alpha DSLRs			•						•	28	77	83	114	900g
16-50mm f/2.8 SSM	£569	4★	Bright short-range telephoto lens			•							100	72	81	88	577g
16-80mm f/3.5-4.5 ZA T*	£709	4.5★	Carl Zeiss standard zoom lens			•							35	62	72	83	445g
16-105mm f/3.5-5.6 DT	£559	3★	An ambitious lens that is good in parts, although quality drops off at 105mm			•							40	62	72	83	470g
18-135mm f/3.5-5.6 DT SAM	£429		A versatile zoom with Direct Manual Focus		•	•							45	62	76	86	398g
18-200mm f/3.5-6.3 DT	£509	3★	While the focal range is certainly useful, the lens is overall an average performer			•							45	62	73	85.5	405g
18-250mm f/3.5-6.3 DT	£559	3.5★	Good overall, but performance dips at longer focal lengths			•							45	62	75	86	440g
20mm f/2.8	£559	3.5★	Wideangle prime lens with rear focusing mechanism and focus range limiter			•						•	25	72	78	53.5	285g
24mm f/2 ZA SSM T*	£1119		An impressively bright wideangle Carl Zeiss lens			•						•	19	72	78	76	555g
24-70mm f/2.8 ZA SSM T*	£1679	5★	Carl Zeiss mid-range zoom lens with superb optics ideal for full-frame Alpha DSLRs			•						•	34	77	83	111	955g
28-75mm f/2.8 SAM	£709		A constant f/2.8 aperture and a Smooth Autofocus Motor (SAM) in this standard zoom			•						•	38	67	77.5	94	565g
30mm f/2.8 DT SAM Macro	£179	4★	Macro lens designed for digital with 1:1 magnification and Smooth Autofocus Motor			•							12	49	70	45	150g
35mm f/1.4 G	£1369		With an equivalent focal length of 52.5mm, a wide aperture and aspherical glass			•						•	30	55	69	76	510g
35mm f/1.8 DT SAM	£179		Budget-price indoor portrait lens			•							23	55	70	52	170g

ALL PRICES ARE RRP'S. STREET PRICES MAY VARY

DSLR Lenses

				IMAGE STABILISATION	SONY ALPHA	CANON	FOUR THIRDS	NIKON	PENTAX	SIGMA	FULL FRAME	MIN FOCUS (CM)	FILTER THREAD (MM)	WIDTH (MM)	LENGTH (MM)	WEIGHT
LENS	RRP	SCORE	SUMMARY		MOUNT								DIMENSIONS			
50mm f/1.8 DT SAM	£159	4.5★	A very useful lens that performs well and carries a rock-bottom price tag		•							34	49	70	45	170g
50mm f/1.4	£369	5★	While this lens performs well overall, performance at f/1.4 could be better		•						•	45	55	65.5	43	220g
50mm f/1.4 ZA SSM	£1300	4★	Carl Zeiss design said to be ideal for quality-critical portraiture and low-light shooting		•						•	45	72	81	71.5	518g
50mm f/2.8 Macro	£529		A macro lens with a floating lens element		•						•	20	55	71.5	60	295g
55-200mm f/4-5.6 DT SAM	£219		Designed for cropped-sensor DSLRs, with a Smooth Autofocus Motor		•							95	55	71.5	85	305g
55-300mm f/4.5–5.6 DT SAM	£309		Compact, lightweight telephoto zoom offering smooth, silent operation		•							140	62	77	116.5	460g
70-200mm f/2.8 G SSM II	£2799		High-performance G Series telephoto zoom lens		•						•	120	77	87	196.5	1340g
70-300mm f/4.5-5.6 G SSM	£869	3.5★	G-series lens with ED elements, Super Sonic wave Motor and a circular aperture		•						•	120	62	82.5	135.5	760g
70-400mm f/4-5.6 G SSM II	£1799		Redesign of original features a new LSI drive circuit and promises faster autofocus		•						•	150	77	95	196	1500g
75-300mm f/4.5-5.6	£219	3★	Compact and lightweight zoom with a circular aperture		•						•	150	55	71	122	460g
85mm f/1.4 ZA Planar T*	£1369		Fixed-focal-length lens aimed at indoor portraiture		•						•	85	72	81.5	72.5	560g
85mm f/2.8 SAM	£219		A light, low-price portraiture lens		•						•	60	55	70	52	175g
100mm f/2.8 Macro	£659		Macro lens with circular aperture, double floating element and wide aperture		•						•	35	55	75	98.5	505g
135mm f/1.8 ZA Sonnar T*	£1429		A bright, Carl Zeiss portrait telephoto lens		•						•	72	77	84	115	1004g
135mm f/2.8 STF	£1119		Telephoto lens fitted with apodisation element to give attractive defocus effects		•						•	87	80	80	99	730g

TAMRON DSLR

10-24mm f/3.5-4.5 SP AF Di II LD Asph. IF	£511	3.5★	Good consistency at 10mm and 18mm, but a steep decline at 24mm		•	•		•	•				24	77	83.2	86.5	406g
15-30mm f/2.8 SP Di VC USD	£950	4★	Excellent value, this is the only wideangle zoom with image stabilisation and an f/2.8 aperture		•	•	•		•		•	28	n/a	98.4	145	1100g	
16-300mm f/3.5-6.3 Di II VC PZD Macro	£600	4★	Versatile megazoom, a very good all-in-one solution, as long as you won't need to enlarge to A2 size		•	•	•		•			39	67	99.5	75	540g	
17-50mm f/2.8 SP AF XR Di II LD Asph. IF	£450	4.5★	Very good optical performance, which peaks at f/5.6-8			•	•		•	•		27	67	74	81.7	434g	
17-50mm f/2.8 SP AF XR Di II VC LD Asph. IF	£541	4.5★	Very strong performance at longer focal lengths but weaker at the other end		•		•		•			29	72	79.6	94.5	570g	
18-200mm f/3.5-6.3 AF Di II VC	£169	4★	Lightweight all-in-one lens for APS-C DSLRs with Vibration Compensation		•	•	•		•			49	62	75	96.6	400g	
18-270mm f/3.5-6.3 AF Di II VC LD PZD IF Macro	£663	3★	The next-generation incarnation offers a new form of ultrasonic engine		•	•	•		•			49	62	74.4	88	450g	
24-70mm f/2.8 SP Di VC USD	£1099	5★	Fast zoom with image stabilisation for both full-frame and APS-C cameras		•	•	•		•		•	38	82	88.2	116.9	825g	
28-75mm f/2.8 SP AF XR Di LD Asph. IF Macro	£460		Standard zoom with constant f/2.8 aperture and minimum focusing distance of 33cm			•	•		•	•	•	33	67	73	92	510g	
28-300mm f/3.5-6.3 AF XR Di LD Asph. IF Macro	£664		A useful 10.7x zoom range and low-dispersion elements in this optic			•	•		•	•	•	49	62	73	83.7	420g	
28-300mm f/3.5-6.3 Di VC PZD	£529		A new, full-frame, high-power zoom incorporating PZD (Piezo Drive)		•	•	•		•		•	49	67	75	99.5	540g	
35mm f/1.8 Di VC USD	£580	4.5★	Moderately wide prime combines ultrasonic focusing, image stabilisation and a fast aperture		•	•	•		•		•	20	67	80.4	80.8	480g	
45mm f/1.8 Di VC USD	£580	4.5★	A lens that rewrites the standard focal length with a fast aperture coupled with optical stabilisation		•	•	•		•		•	29	67	80.4	89.2	940g	
60mm f/2 SP AF Di II LD IF Macro	£550	5★	Macro lens designed for APS-C sensor cameras, with 1:1 reproduction ratio			•	•		•			23	55	73	80	400g	
70-200mm f/2.8 SP AF Di LD IF Macro	£817	4★	No image stabilisation and no advanced AF system, but at this price it's a steal			•	•		•	•		95	77	89.5	194.3	1150g	
70-200mm f/2.8 Di VC USD	£1099		Compact yet full-size telephoto zoom with vibration compensation		•	•	•		•		•	130	77	85.8	188.3	1470g	
70-300mm f/4-5.6 SP VC USD	£300	4★	Ultrasonic Silent Drive (USD) technology for focusing and Vibration Compensation		•	•	•		•		•	150	62	81.5	142.7	765g	
70-300mm f/4-5.6 AF Di LD Macro	£170	3.5★	Low-dispersion glass and compatible with both full-frame and cropped-sensor DSLRs			•	•		•	•	•	95	62	76.6	116.5	435g	
85mm f/1.8 Di VC USD	£749	5★	The first full-frame 85mm f/1.8 lens with image stabilisation, that's also moisture resistant		•	•	•		•		•	80	67	85	91	700g	
90mm f/2.8 SP AF Di Macro	£470	4★	A very nice macro lens that is capable of producing some fine images			•	•		•	•	•	29	55	71.5	97	405g	
90mm f/2.8 Di Macro 1:1 VC USD	£579		Redesign of the 90mm f/2.8 SP AF Di Macro; comes with vibration compensation		•	•	•		•		•	30	58	115	76.4	550g	
150-600mm f/5-6.3 SP Di VC USD G2	£1340		Updated version of Tamron's popular long telezoom		•	•	•		•		•	220	95	108.4	260.2	2010g	
150-600mm f/5-6.3 SP VC USD	£1150	4★	Longest focal length of any affordable enthusiast zoom on the market and produces excellent results		•	•	•		•		•	270	95	105.6	257.8	1951g	
180mm f/3.5 SP AF Di LD IF Macro	£896	5★	Two Low Dispersion elements and internal focusing system in this 1:1 macro lens			•	•		•	•	•	47	72	84.8	165.7	920g	
200-500mm f/5-6.3 SP AF Di LD IF	£1124	4.5★	A well-matched and consistent set of MTF curves, with good performance at f/8-11			•	•		•		•	250	86	93.5	227	1237g	

TOKINA DSLR

AT-X 10-17mm f/3.5-4.5 AF DX Fisheye	£550		Fisheye zoom lens with Water Repellent coating and Super Low Dispersion glass			•		•					14	n/a	70	71.1	350g
AT-X 11-16mm f/2.8 PRO DX II	£449		Update to the popular 11-16mm f/2.8 lens, for slightly improved optical performance			•	•		•				30	77	84	89.2	550g
AT-X 11-20mm f/2.8 PRO DX	£499		Compact, ultra-wideangle lens featuring an expanded telephoto zoom range			•		•					28	82	89	92	560g
AT-X 12-28mm f/4 PRO DX	£529		Replacement for 12-24mm F4 wideangle zoom; for Nikon DX DSLRs			•		•					25	77	84	90	600g
AT-X 14-20mm f/2 PRO DX	£849		Wideangle zoom with super-fast, super-bright, constant f/2 aperture for shooting in very low light			•		•					28	82	89	106	725g
AT-X 16-28mm f/2.8 PRO FX	£757	5★	A pro-end wideangle zoom aimed at full-frame cameras			•		•			•	26	n/a	90	133	950g	
AT-X 17-35mm f/4 PRO FX	£830	5★	One of the most capable super-wide zooms available, though only available in Canon and Nikon mounts			•		•			•	28	82	89	94	600g	
AT-X 24-70mm f/2.8 PRO FX	£679		Three precision-moulded all-glass aspherical lens elements and a fast, constant f/2.8 aperture			•		•			•	38	82	89.6	107.5	1010g	
AT-X 70-200mm f/4 PRO FX VCM-S	£691		Features a new Vibration Correction Module and ring-shaped ultrasonic style autofocus motor		•			•			•	100	67	82	167.5	980g	
AT-X 100mm f/2.8 AF PRO D Macro	£360	4★	Some weaknesses wide open, but reasonable MTF curves make this a decent optic			•		•			•	30	55	73	95.1	540g	

ZEISS DSLR

15mm Milvus f/2.8	£2329		This super-wideangle lens has an angle of view of 110°			•		•			•	25	95	114	117	947g
18mm Milvus f/2.8	£1999		Compact super-wideangle lens			•		•			•	25	77	107	109	721g
18mm f/3.5 ZF.2	£1150	5★	No AF, but the optical and build qualities of this lens are nothing short of stunning			•		•	•		•	30	82	84	87	470g
21mm f/2.8 Distagon T*	£1579		A wideangle lens that doesn't compromise on optical quality			•		•	•		•	30	82	87	84	510g
25mm f/2 Distagon T*	£1350		A landscape lens with a fast aperture			•		•	•		•	25	67	71	95	570g
28mm f/2 Distagon T*	£850		For low-light shooting the 28mm lens has plenty of potential			•		•	•		•	24	58	64	93	520g
35mm f/1.4 Distagon T*	£1600		Promises to produce some stunning bokeh effects			•		•	•		•	30	72	120	122	850g
35mm f/2 Distagon T*	£940		Relatively compact and affordable premium manual focus lens			•		•	•		•	30	58	64	97	530g
50mm Milvus f/1.4	£949	5★	An exceptionally good portrait lens offering sharpness, detail, clean edges and a great user experience			•		•			•	45	67	82.9	94	922g
85mm Milvus f/1.4	£665	5★	Fast 85mm prime lens that's perfect for portraiture			•		•			•	80	77	90	110	1210g
100mm f/2 Makro-Planar	£1399		A manual-focus macro lens with absolutely superb optics			•		•	•		•	44	72	76	113	680g
135mm Milvus f/2	£1899		Telephoto lens with a large aperture and smooth bokeh, ideal for medium-distance portrait photography			•		•			•	80	77	129	132	1123g

CSC Lenses

CSC Lenses			IMAGE STABILISATION	CANON M	MICRO 4/3RDS	SONY E	NIKON 1	FUJIFILM X	LEICA L	FULL FRAME	MIN FOCUS (CM)	FILTER THREAD (MM)	WIDTH (MM)	LENGTH (MM)	WEIGHT
LENS	RRP	SCORE	SUMMARY		MOUNT								DIMENSIONS		
CANON CSC															
EF-M 11-22mm f/4-5.6 IS STM	£355		Ultra-wideangle lens with a compact, retractable lens design	•	•						15	55	61	58.2	220g
EF-M 15-45mm f/3.5-6.3 IS STM	£249		Collapsible standard zoom for EOS M-series cameras that's less bulky than the 18-55mm	•	•						25	49	60.9	44.5	130g
EF-M 18-55mm f/3.5-5.6 IS STM	£269		Compact and versatile zoom lens	•	•						25	52	61	61	210g
EF-M 18-150mm f/3.5-6.3 IS STM	£399		Wide-ranging 29-240mm equivalent superzoom with surprisingly good image quality	•	•						25	55	60.9	86.5	300g
EF-M 22mm f/2 STM	£220		Small and bright wideangle pancake lens		•						15	43	61	23.7	105g
EF-M 28mm f/3.5 IS STM Macro	£294		Small, retractable lens with built-in LED lights for illuminating close-up subjects	•	•						9.7	43	60.9	45.5	130g
EF-M 55-200mm f/4.5-6.3 IS STM	£330		Telephoto zoom that takes you closer to the action	•	•						100	52	60.9	86.5	260g
FUJIFILM CSC															
XF 10-24mm f/4 R OIS	£849		Ultra-wideangle lens, minimal ghosting with Fuji's HT-EBC multi-layer coating	•					•		24	72	78	87	410
XF 14mm f/2.8 R	£729	5★	Ultra-wideangle prime, high resolution to all corners, performance justifies price tag						•		18	58	65	58.4	235g
XF 16mm f/1.4 R WR	£729	5★	Weather-sealed fast prime for X-system users						•		15	67	73.4	73	375g
XC 16-50 f/3.5-5.6 OIS II	£359		Lightweight lens for mirrorless X-series offers 24-75mm equivalent zoom range	•					•		30	58	62.6	98.3	195g
XF 16-55mm f/2.8 R LM WR	£899	5★	A flagship XF standard zoom lens with a constant f/2.8 aperture and weather-resistance						•		60	77	83.3	106	655g
XF 18mm f/2 R	£430	4★	A compact wideangle lens with a quick aperture						•		18	52	64.5	40.6	116g
XF 18-135mm f/3.5-5.6 R LM OIS WR	£699	4★	Weather-resistant zoom for Fujifilm X mount, designed to be the perfect partner for the Fujifilm X-T1	•					•		45	77	75.7	97.8	490g
XF 18-55mm f/2.8-4 R LM OIS	£599		Short zoom lens with optical image stabilisation	•					•		18	58	65	70.4	310g
XF 23mm f/1.4 R	£649		Premium wideangle prime lens with fast maximum aperture						•		28	62	72	63	300g
XF 23mm f/2 R WR	£419		Compact weather-resistant wideangle prime lens						•		22	43	60	51.9	180g
XF 27mm f/2.8	£270		A high-performance single-focal-length lens						•		60	39	23	61.2	78g
XF 35mm f/1.4 R	£439	4★	Shallow depth of field and bokeh effects are simple to achieve with this lens						•		28	52	65	54.9	187g
XF 35mm f/2 R WR	£299	5★	A powerful and weather-resistant lens that feels great and has the performance to match						•		35	43	60	45.9	170g
XF 50mm f/2 R WR	£449		Lightweight weather-resistant short telephoto prime lens that's ideal for shooting portraits						•		39	46	60	59.4	200g
XF 50-140mm f/2.8 R LM OIS WR	£1249		A telephoto zoom with a constant maximum aperture and weather-resistance	•					•		100	72	82.9	175.9	995g
XC 50-230mm f/4.5-6.7 OIS II	£315		The XC lens range is designed to suit Fuji's mid range CSCs, and this lens has optical image stabilisation	•					•		110	58	69.5	111	tbc
XF 55-200mm f/3.5-4.8 R LM OIS	£599	4★	Telephoto with built-in optical image stabilisation plus aperture control ring	•					•		110	62	118	75	580g
XF 56mm f/1.2 R	£899	4★	This wide-aperture portrait lens for X-series cameras has great sharpness and detail and is great value						•		70	62	73.2	69.7	405g
XF 56mm f/1.2 R APD	£769	4★	Adds apodisation element of 56mm f/1.2 for even more attractive background blur						•		70	62	73.2	69.7	405g
XF 60mm f/2.4 XF R Macro	£599		A short lens designed for macro work with half-life-size magnification						•		26.7	39	64.1	70.9	215g
XF 90mm f/2 R LM WR	£699	5★	A classic portrait lens that's sharp, with gorgeous bokeh						•		60	62	75	105	540g
XF 100-400mm f/4.5-5.6 R LM OIS WR	£1399	5★	This superb zoom is both water and dust resistant, and can operate in -10° C temperatures	•					•		175	77	94.8	210.5	1375g
LEICA CSC															
11-23mm f/3.5-4.5 TL	£1450		Wideangle zoom lens for Leica's APS-C mirrorless system						•		20	67	77	73	368g
18-56mm f/3.5-5.6 Vario-Elmar TL	£1280		Relatively large, non-retractable zoom for APS-C mirrorless						•		45	52	63.5	61	256g
23mm f/2 Summicron TL	£1410		Compact, lightweight fast prime that offers a classic 35mm equivalent view on Leica's APS-C CSCs						•		30	52	63.5	38.1	153g
35mm f/1.4 Summilux TL	£1830		High-end fast prime designed to give exceptional image quality						•		30	60	70	77	428g
55-135mm f/3.5-4.5 Apo-Vario-Elmar-TL	£1450		Telephoto zoom that eschews image stabilisation in a bid for maximal optical quality						•		100	60	68	110	500g
60mm f/2.8 Apo-Macro-Elmarit TL	£1920		Macro lens for Leica's APS-C mirrorless cameras offers 1:1 life-size magnification						•		16	60	68	89	320g
24-90mm f/2.8-4 Vario-Elmarit-SL	£3790		Large, but exceptional quality full-frame standard zoom with really useful zoom range						•	•	30	82	88	138	1140g
90-280mm f/2.8-4 Apo-Vario-Elmarit SL	£4930		Premium telephoto zoom for the Leica SL brings longer-than-usual range						•	•	60	82	88	238	1850g
50mm f/1.4 Summilux SL	£4080		Complex 11-element 9-group design with internal focusing for this fast normal prime						•	•	60	82	88	124	1065g
NIKON CSC															
6.7-13mm f/3.5-5.6 VR	£459		Compact, lightweight, ultra-wideangle zoom lens with Vibration Reduction for Nikon 1 system	•					•		25	52	56.5	46	125g
10mm f/2.8	£229	4★	A wideangle lens for Nikon's 1 series of Compact System Cameras						•		20	40.5	55.5	22	77g
10mm f/2.8 AW	£230		Waterproof wideangle prime for Nikon 1 AW 1 underwater CSC								20	40.5	55.5	22	77g
10-30mm f/3.5-5.6 VR	£149		Nikon's kit lens for the 1 series of CSC models	•					•		20	40.5	57.5	42	115g
10-30mm f/3.5-5.6 PD-ZOOM	£284		Compact standard lens for Nikon 1 series CSCs with powered zoom control	•							20	40.5	58	28	85g
10-100mm f/4.5-5.6 VR PD-ZOOM	£679		A powered zoom lens aided by the VR image stabilisation system on 1 system compacts	•					•		300	72	77	95	530g
10-100mm f/4-5.6 VR	£499		CX-format zoom lens with focal length range of 10-100mm (27-270mm 35mm equivalent)	•					•		35	55	60.5	70.5	298g
11-27.5mm f/3.5-5.6	£179		Compact standard zoom for Nikon 1 system						•		30	40.5	57.5	31	80g
18.5mm f/1.8	£179		Nikon's 1 series gains a traditional fast prime						•		20	40.5	56	36	70g
30-110mm f/3.8-5.6 VR	£229		A longer zoom lens, with image stabilisation, for the Nikon 1 series	•					•		100	40.5	60	61	180g
32mm f/1.2	£799		First 1 system lens to offer a silent wave motor and nano crystal coating						•		45	52	66	47	235g
70-300mm f/4.5-5.6 VR	£879		CX-format super-telephoto lens with a surprisingly compact body	•					•		7	62	73	108	550g

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CSC Lenses				IMAGE STABILISATION	CANON M	MICRO 4THIRDS	SONY E	NIKON 1	FUJIX MOUNT	LEICA L	FULL FRAME	MIN FOCUS (CM)	FILTER THREAD (MM)	WIDTH (MM)	LENGTH (MM)	WEIGHT
LENS	RRP	SCORE	SUMMARY		MOUNT									DIMENSIONS		

OLYMPUS CSC

7-14mm f/2.8 ED Pro	£999	4.5★	Super-wideangle zoom lens that's dustproof, splashproof and freeze-proof			•						20	n/a	78.9	105.8	534g
8mm f/1.8 Pro Fisheye	£799		Fisheye lens with impressive image quality that's dustproof, splashproof and freeze-proof			•						12	n/a	62	80	315g
9-18mm f/4-5.6 ED	£630		This super wideangle lens offers an equivalent focal range of 18-36mm in 35mm terms			•						25	52	56.5	49.5	155g
9mm f/8 Fish-eye Body Cap Lens	£89		Slimline lens in a body cap with 140° angle of view			•						20	n/a	56	12.8	30g
12mm f/2.0 ED	£739	5★	A wideangle fixed lens for the Micro Four Thirds system			•						20	46	56	43	130g
12-40mm f/2.8 ED Pro	£899		Weather-resistant standard zoom with top-notch optics and a constant aperture of f/2.8			•						20	62	69.9	84	382g
12-50mm f/3.5-6.3 ED EZ	£349		A weather-resistant zoom lens with manual or electronic zoom			•						20	52	57	83	211g
12-100mm f/4 IS ED Pro	£1099		High-end weather-sealed superzoom lens featuring powerful in-lens IS with Sync IS	•		•						15	72	77.5	116.5	561g
15mm f/8 Body Cap Lens	£69		Strictly speaking an accessory rather than a lens, with basic optics in a tiny plastic housing			•						30	n/a	56	9	22g
17mm f/1.8 MSC	£450	5★	Wide-aperture, wideangle prime boasting excellent peak sharpness and low colour fringing			•						25	46	57	35	120g
17mm f/2.8 Pancake	£300	4★	Tiny wideangle pancake prime with reasonable optics			•						20	37	57	22	71g
14-42mm f/3.5-5.6 II R	£269		A redesigned variation of the standard kit lens			•						25	37	56.5	50	112g
14-42mm f/3.5-5.6 EZ	£329		Compact kit lens for Olympus PEN and OM-D models with powerzoom control			•						20	37	60.6	22.5	93g
14-150mm f/4-5.6 II	£550		High-powered zoom for all your needs – from wideangle to telephoto – plus weather-resistance			•						50	58	63.5	83	285g
25mm f/1.2 ED Pro	£1099		High-precision, high-speed optic with a special lens system construction for edge-to-edge sharpness			•						30	62	70	87	410g
25mm f/1.8	£370		Compact prime lens with ultra-bright f/1.8 aperture			•						25	46	57.8	42	137g
30mm f/3.5 ED Macro	£249		New in the M.Zuiko Premium range, this macro lens features super-fast AF and weighs only 128g			•						9.5	46	57	60	761g
40-150mm f/2.8 ED Pro	£1299	4★	This powerful 80-300mm 35mm equivalent focal length lens offers amazing portability for this pro class			•						70	72	79.4	160	760g
40-150mm f/4-5.6 R	£309		This middle-distance zoom lens has an 80-300mm 35mm-equivalent focal length			•						90	58	63.5	83	190g
45mm f/1.8	£279	5★	Fast-aperture lens for taking portrait shots is sharp, quiet and has no colour fringing			•						50	37	56	46	116g
60mm f/2.8 Macro	£450		High-precision macro lens that's dustproof and splashproof			•						19	46	56	82	185g
75-300mm f/4.8-6.7 ED II	£499		Update featuring Zuiko Extra-low Reflection Optical coating said to reduce ghosting			•						90	58	69	117	423g
75mm f/1.8 ED	£799	5★	Ultra-fast prime lens ideal for portraits and action shots			•						84	58	64	69	305g
300mm f/4 IS Pro	£2200		Compact ultra-telephoto prime with optical image stabilisation, compatible with Sync IS	•		•						140	77	92.5	227	1270g

PANASONIC CSC

G 7-14mm f/4	£1300	5★	For a wideangle zoom, the overall level of resolution is very impressive			•						25	n/a	70	83.1	300g
G 8mm Fisheye f/3.5	£730		The world's lightest and smallest fisheye lens for an interchangeable-lens camera			•						10	22	60.7	51.7	165g
DG 12mm f/1.4 Leica Summilux ASPH	£1199	4.5★	Compact fast wideangle quality with excellent optics and built-in aperture ring			•						20	62	70	70	335g
G 12-32mm f/3.5-5.6 MEGA OIS	£270		Very compact with a versatile zoom range and three aspherical lenses	•		•						20	37	55.5	24	70g
G X 12-35mm f/2.8 OIS	£1095	5★	Fast, high-quality standard zoom for Micro Four Thirds cameras	•		•						25	58	67.6	73.8	305g
G X 12-35mm f/2.8 OIS II	£880		Updated fast standard zoom with matte-black finish and improved autofocus and aperture control	•		•						25	58	67.6	73.8	305g
G 12-60mm f/3.5-5.6 OIS ASPH	£439		Incorporates a stepping motor for a smooth, silent operation and features a dust and splashproof design	•		•						20	58	66	71	210g
DG 12-60mm f/2.8-4 OIS Leica	£880		Premium standard zoom with useful focal length range and weather-resistant construction	•		•						20	62	68	86	320g
G 14mm f/2.5 II	£249		Wideangle pancake lens which should suit landscape photographers			•						18	46	55.5	20.5	55g
G 14-42mm II f/3.5-5.6 MEGA OIS	£375		Addition of two aspherical elements helps make this lens smaller than previous version	•		•						20	46	56	49	110g
G X 14-42mm f/3.5-5.6 X PZ POWER OIS	£369	4★	Powered zoom; impressive results in terms of both sharpness and chromatic aberration	•		•						20	37	61	26.8	95g
G 14-45mm f/3.5-5.6 MEGA OIS	£189		A lightweight and compact standard zoom featuring MEGA OIS optical image stabilisation	•		•						30	52	60	60	195g
G 14-140mm f/3.5-5.6 POWER OIS	£599		Metal-bodied zoom featuring company's POWER OIS optical image stabiliser	•		•						30	58	67	75	265g
DG 15mm f/1.7 Leica SUMMILUX	£549		High-speed prime with a compact metal body, includes three aspherical lenses to cut down distortion			•						20	46	36	57.5	115g
G 20mm f/1.7 ASPH II	£249		Ultra-compact fast prime with excellent optics but slower autofocus than more modern options			•						20	46	25.5	63	100g
G 25mm f/1.7 ASPH	£159	4.5★	Inexpensive fast normal prime for Micro Four Thirds			•						25	46	60.8	52	125g
DG 25mm f/1.4 Leica SUMMILUX	£550	5★	A fast-aperture fixed focal length standard lens from Leica			•						30	46	63	54.5	200g
G 30mm f/2.8 Macro MEGA OIS	£300	3★	Compact lens offering true-to-life magnification capability for better macro images	•		•						10	46	58.8	63.5	180g
G 35-100mm f/4-5.6 ASPH MEGA OIS	£300		Telephoto zoom equivalent to 70-200mm on a 35mm camera	•		•						90	46	55.5	50	135g
G X 35-100mm f/2.8 Power OIS	£1099		Telephoto zoom with Nano Surface Coating technology for dramatic reduction of ghosting and flare	•		•						85	58	67.4	100	360g
G X 35-100mm f/2.8 Power OIS II	£970		Updated fast telephoto zoom with matte-black finish and improved autofocus and aperture control	•		•						85	58	67.4	100	360g
DG 42.5mm f/1.2 Leica DG OIS	£1399	5★	Mid-telephoto high-speed Leica DG Noctocron lens with 2 aspherical lenses and ultra-wide aperture	•		•						50	67	74	76.8	425g
G 42.5mm f/1.7 Power OIS	£349		Mid-telephoto lens with a 35mm equivalent of 85mm, its f/1.7 aperture promises a beautiful bokeh effect	•		•						37	31	55	50	130g
DG 45mm f/2.8 OIS Macro Leica	£539		Tiny macro lens with 1:1 magnification and optical image stabilisation	•		•						15	46	63	62.5	225g
G 45-150mm f/4-5.6 MEGA OIS	£280	4★	Compact, lightweight telephoto zoom comprising 12 elements in nine groups	•		•						90	52	62	73	200g
G X 45-175mm f/4-5.6 X PZ POWER OIS	£400	4★	A powered long-focal-length zoom lens	•		•						90	46	61.6	90	210g
G 45-200mm f/4-5.6 MEGA OIS II	£380		Updated telephoto zoom lens with dust and splashproof construction, supports Panasonic's Dual IS	•		•						100	52	70	100	380g
G 100-300mm f/4-5.6 MEGA OIS	£550	4★	Long zoom lens offering optical image stabilisation	•		•						100	52	70	100	380g
G 100-300mm f/4-5.6 MEGA OIS II	£570	4★	Updated long zoom lens with dust and splashproof construction, supports Panasonic's Dual IS	•		•						100	52	70	100	380g
DG 100-400mm f/4-6.3 OIS Leica	£1349		Top-quality supertelephoto zoom with weathersealed construction and Dual IS support	•		•						103	72	83	171.5	985g



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CSC Lenses

CSC Lenses

LENS	RRP	SCORE	SUMMARY		IMAGE	STABILISATION	CANON M	MICRO 4/3RDS	SONY E	NIKON 1	FUJIX MOUNT	LEICA L	FULL FRAME	MIN FOCUS (CM)	FILTER THREAD (MM)	WIDTH (MM)	LENGTH (MM)	WEIGHT
SAMYANG CSC																		
7.5mm f/3.5 UMC fisheye MFT	£253		Fisheye manual focus lens with Ultra Multi Coated lens elements to reduce flare and ghosting					•						9	n/a	48.3	60	197g
8mm f/2.8 UMC fisheye II	£249		Updated version of the Samyang 8mm f/2.8 UMC Fisheye lens, with improved optical construction			•		•		•				30	n/a	60	64.4	290g
12mm f/2 NCS CS	£330		Fast wideangle prime for APS-C and Micro Four Thirds mirrorless cameras				•	•	•		•			20	67	72.5	59	245g
14mm f/2.8 FE AF	£389		Autofocus wideangle prime designed for Sony Alpha 7-series cameras						•				•	20	n/a	85.5	97.5	505g
21mm f/1.4 ED AS UMC CS	£259	5★	Manual-focus low-light lens for mirrorless cameras with APS-C or smaller-sized sensor				•	•	•		•			28	58	54.3	67.9	290g
35mm f/1.2 ED AS UMC CS	£359		Standard-angle manual-focus lens for mirrorless cameras with APS-C sensor size				•	•	•		•			38	62	67.5	74.2	420g
50mm f/1.2 AS UMC CS	£299	5★	Fast telephoto zoom that can produce stunning results with a super-shallow depth of field				•	•	•		•			50	62	67.5	74.5	380g
50mm f/1.4 FE AF	£499		Fast normal prime designed for Sony Alpha 7-series cameras						•				•	45	67	73.5	97.7	585g
300mm f/6.3 ED UMC CS Reflex Mirror Lens	£249		A compact reflex mirror lens dedicated for mirrorless compact system cameras				•	•	•		•			90	58	73.7	64.5	320g
SIGMA CSC																		
19mm f/2.8 DN A	£189		Metal-bodied high-performance wideangle prime lens					•	•					20	46	60.8	45.7	150g
30mm f/1.4 DC DN C	£300	4★	A prime for Micro Four Thirds and Sony E-mount users, it's impressively sharp even at f/1.4					•	•					30	52	64.8	73	140g
30mm f/2.8 DN A	£189		Uses a high-quality double-sided aspherical lens for a performance that's worthy of Sigma's 'Art' line						•	•				30	46	60.8	40.5	140g
60mm f/2.8 DN A	£189		Latest addition to Sigma's 'Art' range is a mid-range, high-performance telephoto lens with metal body						•	•				50	46	60.8	55.5	190g
SONY CSC																		
E 10-18mm f/4 OSS	£750	4★	Super-wideangle zoom with Super ED glass and Optical SteadyShot image stabilisation		•				•					25	62	70	63.5	225g
E 16mm f/2.8	£220	4★	Pancake lens for NEX system, with a circular aperture and Direct Manual Focus						•					24	49	62	22.5	67g
FE 16-35mm f/4 ZA OSS Vario-Tessar T*	£1289	5★	Zeiss full-frame wideangle zoom lens		•					•			•	28	72	78	98.5	518g
E 16-50mm f/3.5-5.6 PZ OSS	£299		Compact lens with Power Zoom, ED glass and Optical SteadyShot image stabilisation		•				•					25	40.5	64.7	29.9	116g
E 16-70mm f/4 ZA OSS Vario-Tessar T*	£839		A lightweight, versatile mid-range zoom with a constant f/4 aperture		•				•					35	55	66.6	75	308g
E 18-55mm f/3.5-5.6 OSS	£270		Optical SteadyShot, said to be silent during movie capture, and a circular aperture		•				•					25	49	62	60	194g
E 18-105mm f/4 G PZ OSS	£499		Sony G lens for E-mount cameras with a constant f/4 aperture		•				•					45	72	78	110	427g
E 18-200mm f/3.5-6.3 OSS LE	£489		Smaller and lighter than comparable lenses, this is an ideal high-magnification travel lens		•				•					50	62	68	98	460g
E 18-200mm f/3.5-6.3 PZ OSS	£999		Boasts powered zoom and image stabilisation with Active Mode, making it ideal for movies		•				•					30	67	93.2	99	649g
E 20mm f/2.8	£309		Pancake wideangle lens promises to be the perfect walkaround partner for E-mount cameras						•					20	49	62.6	20.4	69g
E 24mm f/1.8 ZA Sonnar T*	£839		Top-quality Carl Zeiss optic ideally suited to the NEX-7							•				16	49	63	65.6	225g
FE 24-240mm f/3.5-6.3 OSS	£929		Ideal for travel, landscapes and more, with built-in stabilisation. Also dust and moisture resistant		•				•				•	50	72	80.5	118.5	780g
FE 24-70mm f/2.8 GM	£1799	5★	This pro-grade standard lens for the Sony full-frame FE mount gives exceptionally sharp results						•				•	38	82	87.6	136	886g
FE 24-70mm f/4 ZA OSS Vario-Tessar T*	£1049		Compact lens with an f/4 maximum aperture across the zoom range and built-in image stabilisation		•				•				•	40	67	73	94.5	426g
FE 28mm f/2	£419		This full-frame wideangle prime with a bright f/2 maximum aperture promises excellent sharpness						•				•	29	49	64	60	200g
FE 28-70mm f/3.5-5.6 OSS	£449		Built-in Optical SteadyShot image stabilisation, lightweight, and a popular zoom range		•				•				•	30	55	72.5	83	295g
FE 28-135mm PZ f/4 G OSS	£2379		High-performance G-Series standard zoom lens, constant f/4 aperture, for high-quality moviemaking		•				•				•	95	95	162.5	105	1215g
E 30mm f/3.5 Macro	£219		A macro lens for the NEX Compact System Cameras						•					9	49	62	55.5	138g
FE 35mm f/1.4 ZA Distagon T*	£1559		Full-frame ZEISS Distagon lens with large, bright f/1.4 aperture						•				•	30	72	73	94.5	630g
E 35mm f/1.8 OSS	£399		Lightweight versatile prime with Optical SteadyShot image stabilisation		•				•					30	49	62.2	45	155g
FE 35mm f/2.8 ZA Sonnar T*	£699		When coupled with a full-frame Sony E-mount camera, this prime lens promises to deliver						•				•	35	49	61.5	36.5	120g
E 50mm f/1.8 OSS	£219		A handy, low-price portrait lens for the NEX range		•				•					39	49	62	62	202g
FE 50mm f/1.4	£1500	5★	Optically stunning premium fast prime, but huge and heavy						•				•	45	72	83.5	108	778g
FE 50mm f/1.8	£240		Features a new optical design with a single aspherical element						•				•	45	49	68.6	59.5	186g
FE 50mm f/2.8 Macro	£500		Sony's budget macro for full-frame CSCs offers decent optics but is slow at focusing						•				•	16	55	70.8	71	236g
FE 55mm f/1.8 ZA Sonnar T*	£849		35mm full-frame prime lens with wide aperture allowing good images indoors or in low light						•				•	50	49	64.4	70.5	281g
E 55-210mm f/4.5-6.3 OSS	£289		Lightweight telephoto zoom lens for the NEX range		•				•					100	49	63.8	108	345g
FE 70-200mm f/4 G OSS	£1359	4★	G-series telephoto zoom lens, dust and water resistant, with built-in image stabilisation		•				•				•	100	72	80	175	840g
FE 70-200mm f/2.8 GM OSS	£2500		Compact, lightweight telephoto zoom lens for full-frame E-mount bodies		•				•				•	100	72	80	175	840g
FE 70-300mm f/4.5-5.6 G OSS	£1150		Sony has added this lens to its growing range		•				•				•	90	72	84	143.5	854g
FE 85mm f/1.4 GM	£1889		Stunning image quality from Sony's premium 'G Master' portrait lens						•				•	80	77	89.5	107.5	820g
FE 90mm f/2.8 Macro G OSS	£1049	4★	The first dedicated macro lens for Sony's full-frame E-mount cameras		•				•				•	28	62	79	130.5	602g
TAMRON CSC																		
14-150mm f/3.5-5.8 Di III	£370	4★	The first Micro Four Thirds lens from Tamron for compact mirrorless interchangeable-lens cameras					•						50	52	63.5	80.4	285g
18-200mm f/3.5-6.3 Di III VC	£390		Lightweight, compact, all-in-one zoom for mirrorless cameras, to cover practically any shooting situation		•	•			•					50	62	68	96.7	460g
ZEISS CSC																		
12mm f/2.8 Touit Distagon T*	£959	5★	Designed specifically for Sony NEX and Fujifilm X-series CSC cameras. Very impressive performance						•		•			18	67	82	68	270g
18mm f/2.8 Batis	£990		The Batis range is for mirrorless full-frame system cameras from Sony						•				•	25	77	78	95	330g
21mm f/2 Loxia	£1230		Compact manual-focus wideangle prime purpose-designed for Sony Alpha 7-series cameras						•				•	25	52	62	72	394g
25mm f/2 Batis	£980	5★	A wideangle lens for Sony full-frame users offering unrivalled quality						•				•	20	67	81	92	355g
32mm f/1.8 Touit Planar T*	£700	4.5★	Optimised for use with APS-C format sensors, a fast standard lens for Fujifilm X-series cameras						•		•			23	52	72	76	200g
35mm f/2 Loxia	£1015		Small wideangle manual focus prime intended for Sony Alpha 7 users						•				•	30	52	62	59	340g
50mm f/2 Loxia	£740		Manual-focus standard prime with premium optics and E mount for Sony Alpha 7 users						•				•	45	52	62	59	320g
50mm f/2.8 Touit Planar T*	£589		Macro 1:1 lens for extreme close-ups, as well as shooting portraits or panoramas as a light tele-lens						•		•			15	52	75	91	290g
85mm f/1.8 Batis	£909	5★	A high-quality medium prime for wedding and portrait shooters, developed for Sony's Alpha-7 series						•				•	80	67	78	105	475g
85mm f/2.4 Loxia	£1199		A compact, manual-focus, short telephoto lens for the mirrorless Sony Alpha series						•				•	80	52	62.5	108	594 g

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CONTAX CARL ZEISS 85mm f1.4.....	MINT CASED £399.00
CONTAX 300mm F4 TELE TESSAR MM.....	MINT CASED £69.00
CONTAX MUTAR II 2X TELECONVERTER.....	MINT BOXED £125.00
CONTAX TLA 280 FLASH.....	MINT- £59.00
CONTAX TLA 280 FLASH UNIT.....	MINT BOXED £75.00
CONTAX TIX TITANIUM COMPACT + LEATHER CASE.....	MINT CASED £299.00

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LEICA X VARIO WITH LEICA HOOD AND SP BATT BLK.....	MINT BOXED AS NEW £1,299.00
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LEICA IIC BODY WITH CASE.....	EXC++ £195.00
LEICA IIC RED BLIND RARE.....	EXC++ £345.00
LEICA CL BODY.....	EXC++ £299.00
LEICA CL BODY.....	MINT- £445.00
LEICA CL LUX 2 COMPLETE ALSO LEATHER CASE.....	MINT BOXED £299.00
LEICA MINILUX TRAVEL KIT WITH 8x20 BINOS TITANIUM.....	MINT BOXED £595.00
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LEICA 35mm f1.4 SUMMILUX, HOOD, FILTER No 23917XX.....	MINT £1,299.00
LEICA 35mm f2 SUMMICRON ASPH BLACK 6 BIT LATEST MINT BOXED.....	£1,495.00
LEICA 35mm f2 SUMMICRON.....	MINT BOXED £1,095.00
LEICA 35mm f3.5 SUMMARON M WITH LEICA FILTER.....	MINT- £325.00
LEICA 50mm f2 SUMMICRON CHROME.....	MINT- £545.00
LEICA 50mm f2 SUMMICRON CHROME 11816... MINT BOXED AS NEW.....	£1,195.00
LEICA 50mm f2 SUMMICRON BLACK COMP WITH HOOD.....	MINT BOXED £995.00
LEICA 50mm f2 CLOSE FOCUS SUMM + SPECS.....	EXC++ £595.00
LEICA 50mm f2.5 SUMMARIT M LATEST 6 BIT.....	MINT BOXED AS NEW £745.00
LEICA 5cm F3.5 COLLAPSABLE ELMAR FOR M 13339##.....	MINT- £299.00
LEICA 50mm f2.8 COLLAPSABLE ELMAR.....	MINT- £265.00
LEICA 5cm f3.5 ELMAR RED SCALE.....	MINT- £345.00
LEICA 75mm f2 SUMMICRON APO 6 BIT LATEST.....	MINT BOXED £1,400.00
LEICA 90mm f2 SUMMICRON BLACK 11136.....	MINT BOXED AS NEW £995.00
LEICA 90mm f2.5 SUMMARIT M 6 BIT LATEST + HOOD.....	MINT CASED £799.00
LEICA 9cm, f4 ELMAR COLL FOR M.....	MINT- £175.00
LEICA 135mm f4.5 HEKTOR.....	EXC+ £75.00
VOIGTLANDER 25mm f4.5 SNAPSHOT SKOPAR SCREW.....	MINT £195.00
VOIGTLANDER 75mm f2.5 COLOR HELIAR ASP L39 BLK.....	MINT BOXED £279.00
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VOIGTLANDER BESSA R GRIP FOR R,R2,R3 ETC.....	MINT BOXED £49.00
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LEICA 5cm f2 SUMMITAR COLL + M MOUNT.....	EXC++IN KEEPER £275.00
LEICA 135mm f2.8 ELMARIT M WITH SPECS.....	EXC+++ £299.00
LEICA 135mm f4.5 HEKTOR + HOOD M MOUNT.....	EXC++ £99.00
LEICA 135mm f4.5 HEKTOR IN KEEPER.....	EXC+++ £199.00
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LEICA 90mm f4 ELMAR BLACK SCREW.....	EXC++ £145.00
LEICA 135mm f4.5 HEKTOR + HOOD SCREW.....	EXC++ £99.00
LEICA SF20 FLASH FOR M6 etc.....	MINT BOXED £89.00
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LEICA WINDER M4-2 FOR M4 ETC.....	MINT-BOXED £145.00
LEICA R8 MOTORDRIVE 14313 & CHGR 14424.....	MINT BOXED £295.00
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HASSELBLAD 503 CX BODY WITH BACK & WLF.....	MINT- £699.00
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HASSELBLAD 50 - 110 f3.5/4.5 HC FOR H SYSTEM.....	MINT-BOXED £1,195.00
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HASSELBLAD 150mm f4 SONNAR CF.....	MINT-BOXED £395.00
HASSELBLAD 50mm f4 DISTAGON SILVER.....	EXC++ £195.00

HASSELBLAD 120mm f5.6 T* NS PLANNAR C MACRO.....	MINT BOXED £295.00
HASSELBLAD 150mm f4 SONNAR SILVER.....	EXC++ £175.00
HASSELBLAD 250mm f5.6 SONNAR SILVER.....	EXC+ £179.00
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BRONICA 50mm F2.8 ZENANON MC.....	EXC+++ £99.00
BRONICA 110mm F4 MACRO LENS PS.....	MINT- £295.00
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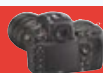
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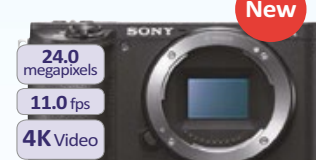
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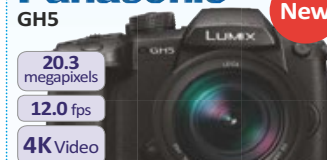
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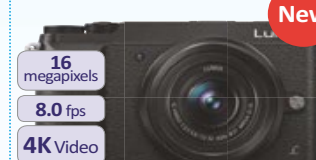
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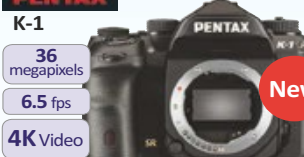
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EF 24-105mm f3.5-5.6 IS STM	£379
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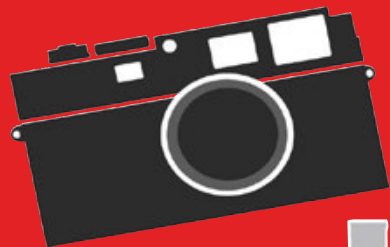
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Olympus E-P1 + 14-42mm	E++ £119	
Olympus E-PL2 Body Only	E++ £129	
Olympus E-PL1 Black Body Only	E++ £69	
Olympus EP-1 + 17mm F2.8 + VF1 Finder	E+ £195	
Panasonic G2 Body Only	E++ £69	
Panasonic GF-5 Body Only	E++ £79	
Panasonic GX7 Body Only	As Seen / E++ £249 - £329	
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Sony A7R II Body Only	E++ / Mint- £2,249 - £2,499	
Sony NEX5R + 16-50mm OSS	E++ £199	
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14mm F2.8 XF	E++ £549	
16-50mm F3.5-5.6 OIS XC	Mint- £149	
23mm F1.4 XF R	Mint- £589	
27mm F2.8 XF	Mint- £229	
50-230mm F4.5-6.7 OIS XC	E++ £189 - £239	
Zeiss 12mm F2.8 Touit X	Mint- £549	
Olympus 11-22mm F2.8-3.5 Zuiko	E++ £199 - £229	
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Panasonic 14-150mm F3.5-5.6 Asph	E+ / E++ £349 - £489	
Olympus 14-42mm F3.5-5.6 Zuiko	E+ £39	
Olympus 14-54mm F2.8-3.5 ZuikoE+ / E++ £119 - £129		
Samyang 16mm F2.0 ED AS UMC CS	Mint- £249	
Olympus 18-180mm F3.5-6.3 Zuiko	E++ £199	
Olympus 35mm F3.5 Macro Zuiko	E++ £99	
Olympus 40-150mm F3.5-4.5 Zuiko	E+ / E++ £49 - £89	
Olympus 40-150mm F4-5.6 ED Zuiko	E++ £49	
Olympus 50-200mm F2.8-3.5 SWD	E++ £399 - £429	
Olympus 50mm F2 ED Macro Zuiko	E++ £199 - £249	
Olympus 70-300mm F4-5.6 ED Zuiko	E++ £219	
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Sigma 150mm F2.8 Apo DG Macro	E++ £249	
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Panasonic 8mm F3.5 G Fisheye	E+ £379	
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Olympus 12-40mm F2.8 M.Zuiko	E++ £499 - £549	
Olympus 12-50mm F3.5-6.3 M Zuiko	E++ £139	
Samyang 12mm F2 NCS CS	E++ £209	
Walimex 12mm F2.2 CS NCS	Mint- £219	
Panasonic 14-45mm F3.5-5.6 ASPH G Vario	E+ / E++ £99 - £129	
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Panasonic 45mm F2.8 DG Asph Macro	E+ / Mint- £359 - £399	
Olympus 60mm F2.8 ED Macro M.Zuiko	Mint- £279	
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



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PG540XL Black 21ml	£19.99
CL541 Colour 8ml	£16.99
CL541XL Colour 15ml	£19.99
PG545XL Black 15ml	£15.49
CL546XL Colour 13ml	£16.99
Compatibles:	
PGI5 Black 27ml	£4.99
CLi8 Colours 13ml	£3.99
PGI5/CLi8 Set of 5	£19.99
PGI520 Black 19ml	£4.99
CLi521 Colours 9ml	£3.99
PGI520/CLi521 Set of 5	£19.99
PGI525 Black 19ml	£4.99
CLi526 Colours 9ml	£3.99
PGI525/CLi526 Set of 5	£19.99
PGI550XL Black 25ml	£4.99
CLi551XL Colours 12ml	£3.99
PGI550/CLi551XL Set 5	£19.99
BCi6 Colours 15ml	£2.99
PG40 Black 28ml	£12.99
CL41 Colour 24ml	£16.99
PG50 Black 28ml	£12.99
CL51 Colour 24ml	£14.99
PG510 Black 11ml	£13.99
CL511 Colour 11ml	£15.99
PG512 Black 18ml	£13.99
CL513 Colour 15ml	£15.99
PG540XL Black 21ml	£13.99
CL541XL Colour 15ml	£14.99
PG545XL Black 15ml	£11.99
PG546XL Black 21ml	£12.99


Many more in stock!

EPSON

No.16 Fountain Pen Inks Originals: No.16 Set of 4 No.16 Black 5.4ml No.16 Colours 3.1ml each	 £28.99 £8.99 £6.99
No.16XL Set of 4 No.16XL Black 12.9ml No.16XL Colours 6.5ml each	 £53.99 £15.99 £12.99
Compatibles: No.16 Set of 4 No.16 Black 12ml No.16 Colours 12ml each	 £14.99 £3.99 £3.99
No.18 Daisy Inks Originals: No.18 Set of 4 No.18 Black 5.2ml No.18 Colours 3.3ml each	 £30.99 £8.99 £7.49
No.18XL Set of 4 No.18XL Black 11.5ml No.18XL Colours 6.6ml each	 £54.99 £16.99 £12.99
Compatibles: No.18 Set of 4 No.18 Black 12ml No.18 Colours 12ml each	 £14.99 £3.99 £3.99
No.24 Elephant Inks Originals: No.24 Set of 6 No.24 Colours 4.6ml each	 £52.99 £8.99
No.24XL Set of 6 No.24XL Colours 8.7ml each	 £87.99 £14.99
Compatibles: No.24 Set of 6 No.24 Black 7ml No.24 Colours 7ml each	 £22.99 £3.99 £3.99

No.26 Polar Bear Inks Originals: No.26 Set of 4 No.26 Black 6.2ml No.26 Colours 4.5ml each	 £35.99 £9.99 £8.99
No.26XL Set of 4 No.26XL Black 12.1ml No.26XL Colours 9.7ml each	 £63.99 £16.99 £15.99
Compatibles: No.26 Set of 4 No.26 Black 10ml No.26 Colours 7ml each	 £14.99 £3.99 £3.99

T0481-T0486 Seahorse Inks Originals: Set of 6 Colours 13ml each	 £89.99 £18.99
Compatibles: Set of 6 Colours 13ml each	 £19.99 £3.99

T0541-T0549 Frog Inks Originals: Set of 8 Colours 13ml each	 £112.99 £14.99
Compatibles: Set of 8 Colours 13ml each	 £27.99 £3.99

T0591-T0599 Lily Inks Originals: Set of 8 Colours 13ml each	 £102.99 £12.99
Compatibles: Set of 8 Colours 13ml each	 £27.99 £3.99

More Epson inks >>>

Albums & Frames

We now stock a comprehensive range of frames, mounts, albums and accessories. The full range can be viewed on our website, with detailed close-up images of each product to help you choose the perfect way to display your printed photographs. Below is just a tiny sample of what we offer:



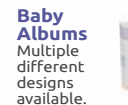
Grace Albums
Available in Burgundy or Blue.



Travel Albums
Over a dozen designs in stock.



Grafton Albums
Available in Burgundy or Blue.

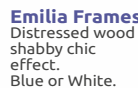


Baby Albums
Multiple different designs available.



Traditional Style Albums:
Grace 29x32cm 100 pages £14.99
Grafton 29x32cm 100 pgs £14.99
Baby 29x32cm 100 pages £12.99

Accessories:
Photo Corners Pack of 250 £2.99
Photo Stickers Pack of 500 £1.99



Emilia Frames
Distressed wood shabby chic effect. Blue or White.



Rio Frames
Handcrafted solid wood with 30mm wide profile, in four colours.



Frisco Frames
Simple, basic design available in a huge range of sizes & colours.







Wood Bevel, Glass Front:
Emilia 6x4 two colours £4.99
Emilia 7x5 two colours £5.99
Emilia 8x6 two colours £6.99
Emilia 10x8 two colours £7.99
Emilia 12x8 two colours £8.99
Rio 6x4 four colours £5.99
Rio 7x5 four colours £6.99
Rio 8x6 four colours £7.99
Rio 10x8 four colours £8.99
Rio 12x8 four colours £9.99



More Ink Cartridges...



EPSON

T0711-T0714 Cheetah Inks Originals: Set of 4 Black 7.4ml Colours 5.5ml each	 £42.99 £10.99 £10.99
Compatibles: Set of 4 Black 7.4ml Colours 5.5ml each	 £14.99 £4.99 £3.99


T0791-T0796 Owl Inks Originals: Set of 6 Colours 11.1ml each	 £88.99 £14.99
Compatibles: Set of 6 Colours 11.1ml each	 £19.99 £3.99

T0801-T0806 Hummingbird Inks Originals: Set of 6 Colours 7.4ml each	 £67.99 £11.49
Compatibles: Set of 6 Colours 7.4ml each	 £19.99 £3.99

T0871-T0879 Flamingo Inks Originals: Set of 8 Colours 11.4ml each	 £76.99 £9.99
Compatibles: Set of 8 Colours 11.4ml each	 £27.99 £3.99

T0961-T0969 Husky Inks Originals: Set of 8 Colours 11.4ml each	 £78.99 £9.99
Compatibles: Set of 8 Colours 11.4ml each	 £27.99 £3.99

T1571-T1579 Turtle Inks Originals: Set of 8 Colours 25.9ml each	 £166.99 £20.99
Compatibles: Set of 8 Colours 25.9ml each	 £27.99 £3.99

T7601-T7609 Killer Whale Originals: Set of 9 Colours 25.9ml each	 £187.99 £20.99
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hp

Originals: No.38 Colours 27ml each No.62XL Black 12ml No.62XL Colour 11.5ml No.300 Black 4ml No.300 Colour 4ml No.301 Black 3ml No.301 Colour 3ml No.301 Black+Colour 3ml No.301XL Black 8ml No.301XL Colour 6ml No.302XL Black 8ml No.302XL Black 8ml No.350 Black 4.5ml No.351 Colour 3.5ml No.363 SET OF 6 No.364 Black 6ml No.364 PB/C/M/Y 3ml each No.364 SET OF 4 No.364XL PB/C/M/Y 6ml each No.364XL SET OF 4 No.920XL SET OF 4 No.932XL SET OF 4 No.950XL SET OF 4	 £29.99 £24.99 £28.99 £12.99 £14.99 £10.99 £13.49 £19.99 £22.99 £22.99 £21.99 £21.99 £14.99 £17.99 £49.99 £8.99 £7.99 £26.99 £15.99 £15.99 £59.99 £51.99 £50.99 £79.99
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Compatibles: No.15 Black 46ml No.21 Black 10ml No.22 Colour 21ml No.45 Black 45ml No.56 Black 24ml No.57 Colour 24ml No.62XL Black 12ml No.62XL Colour 12ml No.78 Colour 36ml No.110 Colour 12ml No.300XL Black 18ml No.300XL Colour 18ml No.301XL Black 15ml No.301XL Colour 18ml No.337 Black 21ml No.338 Black 21ml No.339 Black 34ml No.343 Colour 21ml No.344 Colour 21ml No.350XL Black 30ml No.351XL Colour 20ml No.363 SET OF 6 No.364 Black 10ml No.364 Colours 5ml each No.364 SET OF 4 No.364XL Black 18ml No.364XL Colours 11ml each No.364XL SET OF 4 No.920XL SET OF 4 No.932XL SET OF 4 No.940XL SET OF 4 No.950XL SET OF 4	 £3.99 £6.99 £11.99 £6.99 £6.99 £11.99 £14.99 £15.99 £8.99 £9.99 £12.99 £13.99 £13.99 £9.99 £10.99 £11.99 £12.99 £13.99 £15.99 £19.99 £3.79 £3.29 £12.99 £4.99 £4.29 £16.99 £19.99 £29.99 £29.99 £29.99
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Many more in stock!

Photo Papers

We carry a massive range of papers (sheets & rolls) at competitive prices. Below are some examples of the selection we stock.



Photo Glossy 160gsm: 6x4 50 sheets +50 FREE Photo Satin 200gsm: 6x4 100 sheets +100 FREE A4 20 sheets Photo Glossy 200gsm: 6x4 100 sheets +100 FREE A4 20 sheets Premium Pearl 270gsm: 6x4 50 sheets +50 FREE A4 50 sheets Premium Gloss 270gsm: 6x4 50 sheets OFFER A3 25 sheets OFFER A3+ 25 sheets OFFER Smooth Pearl 310gsm: 6x4 100 sheets 7x5 100 sheets A4 25 sheets A4 100 sheets A4 250 sheets A3 25 sheets A3+ 25 sheets 17" Roll 30 metres 24" Roll 30 metres Smooth Gloss 310gsm: 6x4 100 sheets 7x5 100 sheets A4 25 sheets A4 100 sheets A3 25 sheets A3+ 25 sheets Premium Matt Duo 200 gsm: A4 50 sheets Heavy Duo Matt 310gsm: A4 50 sheets A3+ 50 sheets Gold Fibre Silk 310gsm: A4 50 sheets A3+ 50 sheets Gold Mono Silk 270gsm: A4 25 sheets A3+ 25 sheets	 £3.99 £9.99 £6.99 £9.99 £6.99 £6.99 £16.99 £6.99 £15.99 £19.99 £17.99 £21.99 £16.99 £47.99 £99.99 £31.99 £43.99 £84.99 £119.99 £17.99 £21.99 £16.99 £47.99 £31.99 £43.99 £14.99 £18.99 £51.99 £43.99 £109.99 £18.99 £49.99
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Fotospeed

Smooth Pearl 290gsm: 6x4 100 sheets 7x5 100 sheets A4 50 sheets A3 50 sheets A3+ 25 sheets Panoramic 25 sheets 17" Roll 30 metres 24" Roll 30 metres PF Lustre 275gsm: 6x4 100 sheets 7x5 100 sheets A4 50 sheets A3 25 sheets A3+ 50 sheets Panoramic 25 sheets 17" Roll 30 metres 24" Roll 30 metres PF Gloss 270gsm: A4 50 sheets A3 50 sheets A3+ 50 sheets Panoramic 25 sheets Matt Ultra 240gsm: A4 50 sheets A3 50 sheets A3+ 50 sheets Fine Art / Fibre Base Papers: Baryta A4 20 sheets Baryta A3 20 sheets Etching A4 25 sheets Etching A3 25 sheets Smooth Cotton A4 25s Smooth Cotton A3 25s	 £12.99 £16.99 £17.99 £34.99 £25.99 £26.99 £68.99 £85.99 £12.99 £16.99 £17.99 £35.99 £47.99 £26.99 £69.99 £86.99 £17.99 £35.99 £47.99 £26.99 £12.99 £26.99 £35.99 £21.99 £42.99 £19.99 £34.99 £24.99 £51.99
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Canon

PP-201 Plus Glossy II 275gsm: 6x4 50 sheets 7x5 20 sheets A4 20 sheets A3 20 sheets A3+ 20 sheets PT-101 Pro Platinum 300gsm: 6x4 20 sheets A4 20 sheets A3 20 sheets A3+ 10 sheets SG-201 Semi-Gloss 260gsm: 6x4 50 sheets A4 20 sheets A3 20 sheets A3+ 20 sheets LU-101 Pro Lustre 260gsm: A4 20 sheets A3 20 sheets A3+ 20 sheets	 £9.99 £11.99 £11.99 £27.99 £36.99 £8.99 £17.99 £40.99 £26.99 £10.99 £11.99 £27.99 £44.99 £15.99 £33.99 £51.99
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Many more in stock!



Smooth Pearl 280gsm: 6x4 100 sheets 7x5 100 sheets A4 50 sheets A3 50 sheets A3+ 25 sheets 17" Roll 30 metres 24" Roll 30 metres Ultra Pearl 295gsm: 6x4 100 sheets 7x5 100 sheets A4 25 sheets A3 25 sheets A3+ 25 sheets 13" Roll 10 metres 17" Roll 30 metres 24" Roll 30 metres Titanium Lustre 280gsm: A4 25 sheets A3 25 sheets A3+ 25 sheets Oyster 271gsm: 6x4 100 sheets 7x5 100 sheets A4 50 sheets A3 25 sheets A3+ 25 sheets 13" Roll 10 metres 17" Roll 30 metres 24" Roll 30 metres Gloss 271gsm: 6x4 100 sheets 7x5 100 sheets A4 50 sheets A3 25 sheets A3+ 25 sheets 13" Roll 10 metres 17" Roll 30 metres 24" Roll 30 metres Matt Plus 240gsm: 6x4 100 sheets 7x5 100 sheets A4 50 sheets A3 25 sheets A3+ 2
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128GB £63.99

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64GB £95.99

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Sandisk Ultra 266X (40MB/s)

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Sandisk Extreme 400X (60MB/s)

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64GB £34.99

Sandisk Extreme Pro 633X (95MB/s)

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128GB £82.99

1866X (280MB/s)

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32GB £79.99
64GB £129.99

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Lexar Professional 800X (120MB/s)

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32GB £36.99
64GB £56.99

1066X (160MB/s)

16GB £33.99
32GB £56.99
64GB £99.99
128GB £192.99

Sandisk Ultra 333X (50MB/s)

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32GB £24.99

Sandisk Extreme 800X (120MB/s)

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32GB £32.99
64GB £47.99
128GB £94.99

Sandisk Extreme Pro 1066X (160MB/s)

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32GB £47.99
64GB £82.99
128GB £149.99

XQD Cards

Lexar Professional 1333X (200MB/s)

32GB £69.99
64GB £99.99

MicroSDHC & SDXC

Lexar Professional 633X (95MB/s)

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Delkin Professional 375X (56MB/s)

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64GB £32.99

Sandisk Ultra 320X (48MB/s)

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64GB £24.99

Readers & Cases

Lexar USB3 Card Reader £22.99

Lexar HR1 Workflow Hub £49.99

Delkin USB2 Card Reader £9.99

Delkin USB3 Card Reader £19.99

Delkin SD Card (x8) Case £6.99

Delkin CF Card (x4) Case £6.99

Batteries

Replacement rechargeable Li-Ion batteries, manufactured by Hahnel or Blumax. All come with a two-year guarantee.

NB-2L/LH for Canon £9.99

NB-4L for Canon £9.99

NB-5L for Canon £9.99

NB-6L for Canon £9.99

NB-7L for Canon £9.99

NB-9L for Canon £9.99

NB-10L for Canon £12.99

NB-11L for Canon £12.99

BP-511 for Canon £12.99

LP-E5 for Canon £9.99

LP-E6 for Canon £16.99

LP-E8 for Canon £12.99

LP-E10 for Canon £12.99

LP-E12 for Canon £12.99

NP45 for Fuji £9.99

NP50 for Fuji £9.99

NP95 for Fuji £9.99

NPW126 for Fuji £12.99

NP400 for Fuji £12.99

EN-EL3E for Nikon £14.99

EN-EL5 for Nikon £9.99

EN-EL9 for Nikon £12.99

EN-EL10 for Nikon £9.99

EN-EL11 for Nikon £9.99

EN-EL12 for Nikon £9.99

EN-EL14 for Nikon £19.99

EN-EL15 for Nikon £24.99

EN-EL19 for Nikon £12.99

EN-EL20 for Nikon £12.99

EN-EL21 for Nikon £12.99

Li10B/12B for Olympus £9.99

Li40B/42B for Olympus £9.99

Li50B for Olympus £9.99

BLM-1 for Olympus £12.99

BLS-1 for Olympus £12.99

BLS-5 for Olympus £15.99

CGR-S006 for Panasonic £9.99

CGA-S007 for Panasonic £9.99

DMW-BCG10 Panasonic £19.99

DMW-BCM13 Panasonic £27.99

DMW-BLB13 Panasonic £23.99

DMW-BLC12 Panasonic £23.99

DMW-BLD10 Panasonic £22.99

DMW-BLG10 Panasonic £22.99

DMW-BMB9 Panasonic £22.99

D-Li90 for Pentax £12.99

D-Li109 for Pentax £12.99

SLB-1137D for Samsung £9.99

SLB-1674 for Samsung £12.99

BG-1 for Sony £19.99

BX-1 for Sony £14.99

BY-1 for Sony £12.99

NP-FM500H for Sony £19.99

NP-FH50 for Sony £19.99

NP-FW50 for Sony £24.99

Battery Grips

Professional battery grips, made by Hahnel.

5DMkIII for Canon £84.99

5DMkIII for Canon £84.99

6D for Canon £84.99

7D for Canon £84.99

70D for Canon £84.99

650D/700D for Canon £84.99

D600 for Nikon £84.99

D800/D810 for Nikon £84.99

D3300/D5300 for Nikon £74.99

D7100 for Nikon £84.99

Battery Chargers

Universal Chargers

Unipal ORIGINAL £19.99

Unipal PLUS £24.99

Unipal EXTRA £29.99

AA & AAA Chargers

Hahnel TC Novo inc. 4xAA £8.99

Energizer Pro inc. 4xAA £14.99

Energizer 1 Hr inc. 4xAA £22.99

Other Batteries

Pre-Charged Rechargeables £5.24

AA GP Recyco 3+1 FREE

AAA GP Recyco 3+1 FREE £5.24

AA Energizer Extreme (4) £8.99

AAA Energizer Extreme (4) £6.99

Standard Rechargeables

AA GP 2600mAh (4) £9.99

AA Lloytron 1300mAh (4) £3.99

AA Lloytron 2700mAh (4) £6.99

AAA Lloytron 1100mAh (4) £3.99

Lithium Batteries

AA Energizer Ultimate (4) £5.99

AAA Energizer Ultimate (4) £5.99

CR123A Energizer (1) £1.99

CR2 Energizer (1) £1.99

2CR5 Energizer (1) £3.99

CRP2 Energizer (1) £3.99

CRV3 Energizer (1) £5.99

A544 Energizer Alkaline (1) £1.99

A23 Energizer Alkaline (1) £1.99

LR44 Energizer Alkaline (2) £1.99

CR2025, CR2032 etc £1.99

Filters

One of the largest ranges of screw-in threaded filters in the UK, from Hoya, Kood and Marumi. We carry sizes from 24mm, up to 105mm, and offer Clear Protectors, UVs, Skylights, Circular Polarisers, ND4s, ND8s, ND16s, ND32s, ND64s, ND500s, ND1000s, Variable NDs, Starbursts, Close Up Sets and more! Below are just a few examples...

KOOD Slim Frame UV Filters

37mm £4.99
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46mm £4.99
49mm £4.99
52mm £4.99
55mm £5.99
58mm £6.99
62mm £7.99
67mm £8.99
72mm £9.99
77mm £11.99
82mm £14.99
86mm £19.99

KOOD Slim Frame Circular Polarisers

37mm £12.99
40.5mm £12.99
46mm £12.99
49mm £12.99
52mm £14.99
55mm £15.99
58mm £17.99
62mm £19.99
67mm £22.99
72mm £26.99
77mm £29.99
82mm £34.99
86mm £39.99

KOOD ND4 & ND8 Filters

52mm £26.99
58mm £34.99

Marumi DHG Slim Frame Multi-coated Clear Protectors

37mm £10.99
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49mm £10.99
52mm £10.99
55mm £10.99
58mm £11.99
62mm £12.99
67mm £14.99
72mm £15.99
77mm £17.99
82mm £19.99
86mm £22.99

Marumi DHG Slim Frame Multi-coated UV Filters

52mm £13.99
58mm £15.99
62mm £17.99
67mm £19.99
72mm £21.99
77mm £24.99

Marumi DHG Slim Frame Multi-coated Circular Polarisers

52mm £31.99
58mm £35.99
62mm £39.99
67mm £44.99
72mm £49.99
77mm £54.99
82mm £69.99

Square Filters

We stock three widths of square filters: A-type (67mm wide), P-Type (84mm wide) and Z-Type (100mm wide). Made in the UK, Kood square filters are optically flat, with excellent colour density, neutrality and stability. They received a maximum 5 star rating from Digital Camera Magazine.

P-Type: 84mm wide filters

Standard Holder £5.99

Wide Angle Holder £6.99

Filter Wallet for 8 filters £9.99

Adapter Rings 49-82mm £4.99

Circular Polariser £27.99

ND2 Solid £12.99

ND2 Soft Graduated £13.99

ND2 Hard Graduated £13.99

ND4 Solid £12.99

ND4 Soft Graduated £13.99

ND4 Hard Graduated £13.99

ND8 Solid £14.99

ND8 Soft Graduated £15.99

ND8 Hard Graduated £15.99

Light Blue Graduated £12.99

Dark Blue Graduated £12.99

Light Tobacco Graduated £12.99

Dark Tobacco Graduated £12.99

Light Sunset Graduated £14.99

Dark Sunset Graduated £14.99

Starbursts x4, x6, x8 £17.99

Red/Green/Yellow each £14.99

Six-piece ND Filter Kit £59.99

A popular kit containing an ND2, ND2 Soft Grad, ND4, ND4 Soft Grad, Filter Holder, plus Adapter Ring of your choice (49-82mm).

Z-Type: 100mm wide filters

Pro Holder £24.99

Adapter Rings 52-95mm £8.99

ND2 Solid £16.99

ND2 Soft Graduated £17.99

ND2 Hard Graduated £17.99

ND4 Solid £16.99

ND4 Soft Graduated £17.99

ND4 Hard Graduated £17.99

ND8 Solid £18.99

ND8 Soft Graduated £19.99

ND8 Hard Graduated £19.99

Light Blue Graduated £17.99

Dark Blue Graduated £17.99

Light Tobacco Graduated £17.99

Dark Tobacco Graduated £17.99

Light Sunset Graduated £18.99

Dark Sunset Graduated £18.99

A-Type: 67mm wide filters

Standard Holder £4.99

Adapter Rings 37-62mm £8.99

ND2 Solid £10.99

ND2 Graduated £11.99

ND4 Solid £10.99

ND4 Graduated £11.99

ND8 Solid £11.99

ND8 Graduated £12.99

Lens Accessories

Bayonet-Fit Lens Hoods

ES-62 Canon 50/1.8 £9.99

ES-71II Canon 50/1.4 £9.99

ET-60 Canon 75-300/4-5.6 £9.99

ET-65B Canon 70-300/4-5.6 £9.99

ET-67 Canon 100/2.8 Macro £9.99

ET-67B Canon 60/2.8 £9.99

EW-60C Canon 60/2.8 £7.99

EW-63C Canon 18-55 IS STM £9.99

EW-73B Canon 18-55 IS £9.99

EW-78BII Canon 28-135 IS £9.99

EW-78D Canon 18-200 IS £9.99

EW-78E Canon 15-85 IS £12.99

EW-83E Canon 17-40/4.0 £12.99

HB-32 Nikon 18-105 VR £7.99

HB-45 Nikon 18-55 VR £7.99

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Canon Virtual Kits Offer	Phone	EOS 760D Body	£579	TS-E 24mm f3.5L II	£1,649	85mm f1.8 USM	£295
EOS 1DX II - In Stock	£4,899	EOS 1300D + 18-55 IS II	£359	TS-E 17mm f4L	£2,050	85mm f1.2L II	£1,929
EOS 5D Mk IV - In Stock	£3,399	8-15mm f4 L Fisheye	£1249	70-200mm f2.8 L IS II	£1,999	100mm Macro f2.8	£449
EOS 5D III Body	£2,449	10-18mm f4.5-5.6 IS	£239	70-300mm f4-5.6 IS	£449	100mm Macro f2.8 L IS	£669
EOS 5Ds Body	£2,499	11-24mm f4 L	£2,799	70-300mm f4-5.6 L IS	£1,099	300mm f4 L IS	£1,195
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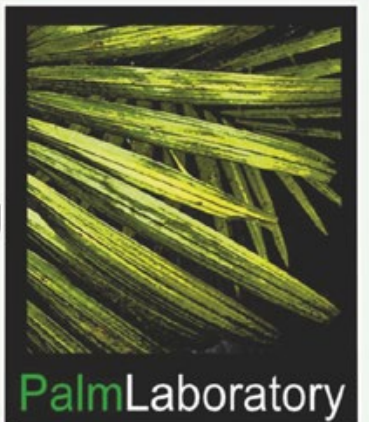


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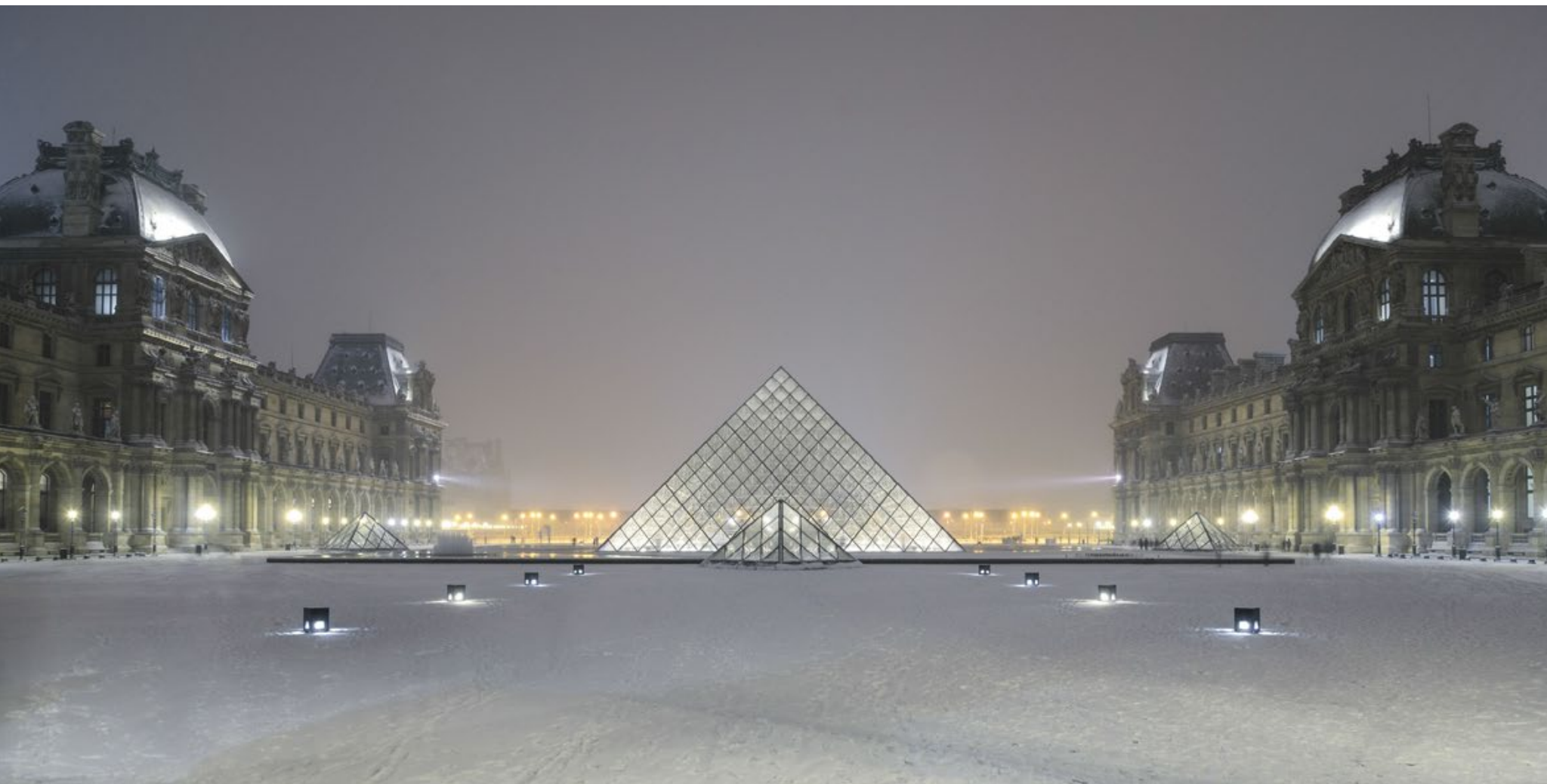




Final Analysis

Roger Hicks considers...

Le Louvre, Paris, January 2013, by Nicolas Jouhet



Snow is magical. So is Paris. But the mere trick of photographing Paris in the snow should not be quite this magical. Why does it work so well here, in this shot by Nicolas Jouhet? Of course, superb composition and perfect exposure explain a lot, but in most great pictures these are taken for granted.

Content is another matter. This image – of the pyramid by IM Pei in the centre of the Louvre – is famous and beautiful to some, but notorious and ugly to others. I have to admit that I was firmly in two minds until I saw this picture. Then I saw it, both literally and figuratively, in a new light. The pyramid was like a space ship that had landed in the middle of classical Paris: a totally fitting combination of past and future. The snow smoothed out the discontinuities of past and present. That is a part of its magic. It is, again literally as

well as figuratively, a great leveller.

The light is fascinating too. Seldom, if ever, has a light-polluted sky been put to such good use. And, of course, there are flares and beams from artificial light sources. I don't know if the snow was still falling when Jouhet took this shot. It rather looks as if it was. Unfortunately, I didn't ask him when I saw the original print.

Ventured out into the cold

Does it matter, though? The important thing is that Jouhet got off his backside and ventured out into the cold, by the look of it at a pretty inhospitable time of night, to take this picture – and several others, at other locations in Paris. Visit www.nicolas-jouhet.com and click on the Paris gallery to see more.

This leads on to a very important point. You have to get your photographs out in the wide, cruel world if you want

people to see them. I saw these at Les Rencontres d'Arles photography festival in France, but they are also on his website. Entering competitions is all well and good, if you like that sort of thing, but unless you win or are well enough placed to be published, your pictures are never seen again – and the weight of failure discourages you from trying to disseminate them more widely. I don't enter competitions any more, but if I did, I'd enter only the ones that fitted in with what I was already doing, or with new series that I wanted to start. Exhibitions (especially at well-known venues and festivals) and a website will get your pictures in front of a far wider audience.

Building a reputation in your own lifetime takes effort. Great pictures are not enough. Unless you are happy to toil without recognition, think hard about how to get your pictures in front of people.

© NICOLAS JOUHET

AP

Roger Hicks has been writing about photography since 1981 and has published more than three dozen books on the subject, many in partnership with his wife Frances Schultz (visit his new website at www.rogerandfrances.eu). Every week in this column Roger deconstructs a classic or contemporary photograph. **Next week he considers an image by Nina Leen**

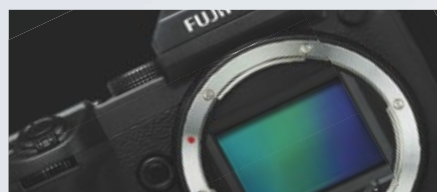


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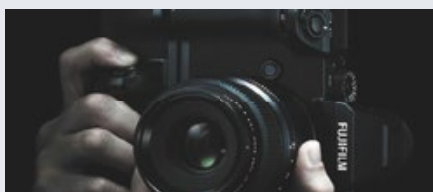
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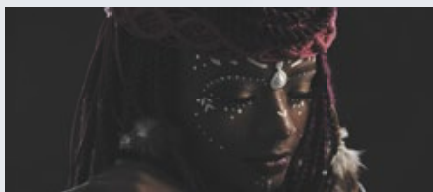
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