Tips from...

Porter's Digital Cameras and Imaging

INFO CENTER

Lens Compatibility with Digital SLR Cameras

CAN 35MM SLR LENSES BE USED ON DIGITAL CAMERAS?

In most cases, the answer is yes. If you have a lens for a fairly recent 35mm SLR camera, it can be used on a new digital SLR from the same maker. (See the information below under the various camera brands for specific details about using existing lenses on new cameras.) If the 35mm camera lens produces good, sharp, contrasty images on film, it will produce good digital photos, too. One big difference is the angle of view. The imaging sensor in most digital cameras is smaller than 35mm film, measuring about 23 x 16mm. Therefore, wide-angle lenses for 35mm camera are not as wide when used on a digital camera, but telephoto lenses are stronger. With 35mm cameras, a 50mm lens is the "normal" focal length that gives you about the same view as the human eye. Below 50mm, the view gets wider, above 50mm it becomes telephoto and draws the subject in closer. For digital cameras, this "normal" focal length is about 32mm, so an old 50mm lens from your 35mm camera will be a short telephoto (equal to 80mm) when used on a digital. An 18-200mm zoom lens for a digital camera has about the same wide coverage and telephoto magnifying power as a 28-300mm lens on a 35mm camera. To convert the equivalent view of a 35mm lens when used on a digital camera, multiply by 1.6X.

A few high-end digital cameras, such as the Canon EOS 1Ds and EOS 5D have full-frame sensors. Since these sensors match the 24mm x 36mm size of 35mm film, there is no conversion factor when they are used with 35mm lenses.

LENS CONVERSION FOR VARIOUS CAMERA FORMATS

	Extreme Wide 97 degrees AOV	**Wide Angle** 75 degrees AOV	**Normal** 46 degrees AOV	**Short Tele** 27 degrees AOV	**Moderate Tele** 12 degrees AOV
Digital SLR (1.6X factor)	12mm	18mm	32mm	56mm	128mm
35mm Film	19mm	28mm	50mm	90mm	200mm
6x6cm Film	40mm (88 deg.)	50mm	80mm	150mm (30 deg.)	350mm (13 deg.)

AOV = angle of view 6x6cm = 2-1/4 x 2-1/4" format on 120 film

DIGITAL-ONLY LENSES

Since the future of SLR photography is digital and since most digital cameras have sensors that are smaller than 35mm film, manufacturers are making digital-only lenses. The primary difference is the reduced area of coverage provided by digital-only lenses. These lenses have the same mounting style as 35mm format lenses and they can be mounted on 35mm camera bodies (except Canon EF-S lenses), but they will not cover the full image size. This causes vignetting around the edges of the 35mm image, especially at the widest end of the lens zoom range.

The surface of a CCD or CMOS sensor in a camera is shinier than film emulsion, so there can be more light rays reflecting off the sensor, back thru the lens. Digital-only lenses have more extensive coatings on the back sides of the lens elements to absorb this stray light and preserve image contrast.

CANON

In the late-1980s, Canon introduced the EOS 35mm camera system with autofocus and the latest electronic technology. Canon lenses for EOS cameras are marked EF on the front, such as “EF 28-85mm”. With the introduction of digital SLRs, Canon continues with the EF lens system. All EF-series lenses for 35mm cameras can be used on all Canon small sensor and full-size sensor digital SLRs. When Canon created the Digital Rebel, they introduced a line of digital-only lenses are called EF-S series lenses. These lenses have the same physical mount and electronic coupling system, but cannot be used on older Canon digital cameras and on no Canon 35mm cameras. This is because the rear portion of EF-S lenses extends deeper into the mirror chamber and damage to the mirror on older cameras can occur. Canon EF-S lenses should only be used on the Canon EOS 20D, 30D and Digital Rebel series and newer models designed to be compatible with EF-S lenses.

Before the EOS system was introduced, Canon cameras used a different lens mounting system called the “FD” mount. These manual-focus lenses had a mechanical aperture ring and cannot be used on EOS film or digital cameras.

MINOLTA MAXXUM/SONY ALPHA

Minolta introduced the first 35mm autofocus camera system in 1985, sold in the U.S. as Maxxum cameras. After merging with Konica, the Maxxum 7D and 5D digital cameras continued with the Maxxum lens system. In early 2006, Konica Minolta left the camera industry. Sony took over the Maxxum digital SLR system and renamed it the Alpha system. The first Sony Alpha, the A100 is similar in many ways to the last Maxxum, the 5D. Lenses interchange completely between Maxxum and Alpha cameras, so a 20-year old Maxxum lens can be used on a Sony Alpha camera, and vice versa.

Prior to the Maxxum camera line, Minolta made manual-focus cameras that used a different lens mounting style, usually going by the designation MC or MD. Besides a different lens mount, these lenses has a mechanical aperture ring. They are not compatible with Maxxum or Sony Alpha cameras.

NIKON

Nikon continues with their venerable F lens mounting style used from the very first Nikon 35mm SLR camera back in the 1950s. Nikon currently makes three series of lenses, and all will work on digital SLRs. The DX digital-only series is designed to cover the sensor on all current Nikon D-SLR cameras, but not the 35mm film format. Nikon D-series lenses are for both film and digital cameras and have a mechanical aperture ring plus electronic aperture control for full compatibility with older film cameras. Nikon G-series lenses cover 35mm and digital sensor formats, but don’t have the mechanical aperture control so the camera needs to have electronic aperture capability to use this lens type.

Although the basic physical mount used by Nikon SLR cameras has not changed, there have been numerous changes to meter coupling and autofocus operation so functionality of an old lens on a new Nikon D-SLR camera varies widely. Nikon camera manuals specify the capabilities when various generations of lenses are used on a new camera.

PENTAX

The current line of Pentax digital camera lenses is called the DA series. These lenses have the same mounting style as the Pentax K-mount lenses for 35mm cameras, but have a reduced area of coverage since Pentax D-SLR imaging sensors are smaller than 35mm film. As a result, if a DA lens is used on a Pentax 35mm camera, there will be significant vignetting. DA lenses don’t have a mechanical aperture ring, so meter coupling may be quite limited depending on the film camera’s aperture control requirements.

Perhaps the most backward-compatible camera brand, a new Pentax digital SLR camera will accept a lens made for one of the first Pentax K bayonet-mount 35mm cameras back in the mid-1970s. If the lens has auto aperture control (Pentax KA) and autofocus (Pentax KAF) capability, those features will couple to the D-SLRs controls. A Pentax digital SLR will even accept old Pentax screw-mount lenses made for cameras in the 1960s and early '70s, provided a Pentax Lens Mount Adapter B is used.

Pentax is now collaborating with Samsung on digital SLR design, so present (and most likely, future) Samsung digital SLR cameras use the same lens mounting system as Pentax.

OLYMPUS

Unlike the other 35mm camera brands, Olympus was never successful with their 35mm autofocus SLR system so they didn't have a legacy lens system to use with digital SLR cameras. Thus they created a new lens system open to other camera makers as well, called the Four Thirds system, after the 4:3 aspect ratio of the sensors used by Olympus D-SLRs. The size of sensors used in Olympus D-SLR cameras measure 17.3 x 13mm, much larger than commonly used in "point & shoot" style cameras, but smaller than the approximately 23 x 16mm sensors used by other D-SLR makers. One significant difference is Olympus focal lengths are one-half the equivalent of 35mm format lenses (a 2X factor) for the same field of coverage. So a new 25mm lens is equal in view to a 50mm lens on a 35mm camera, a 14mm wide-angle is equivalent to a 28mm film camera lens, etc. These lenses are designed specifically for digital SLR cameras.

Olympus made an earlier manual-focus 35mm camera system called the OM system. While Olympus makes a lens mount adapter to attach OM lenses onto their D-SLR cameras, there is a significant loss of features.

INDEPENDENT LENS MAKERS

Lenses made by independent lens makers usually have the same compatibility characteristics as camera-branded lenses. For instance, a Tamron lens made for a Canon EOS film camera will work on a Canon digital camera in the same manner as a Canon brand lens. Independent lens makers have often kept mechanical aperture rings on Nikon and Pentax-mount lenses long after those two camera makers have dropped them from all but select series of lenses.

TAMRON

Tamron's latest generation of lenses is called the Di-II series. These digital-only lenses cover digital sensors, without the covering power needed for film. Tamron also has Di lenses that will cover film and digital formats and they have been optimized in their design and multi-coatings to perform better on digital cameras than earlier lenses made only with film photography requirements in mind.

SIGMA

Sigma makes several lines of lenses, with DC format lenses their digital-only line. Sigma's DG lenses are optimized for better performance with digital cameras, but will work fine with 35mm cameras and will cover the full image size.

TOKINA

Pro DX lenses from Tokina are digital-only and won't cover full size sensors or 35mm film. Some Tokina lenses are designated ProD and will work fine for both film and digital cameras and have the improved multi-coatings for excellent digital performance.