34.11 Effect of the ISO on the Quantity of Light Captured by the Sensor Per Second

The ISO film speed (more precisely film sensitivity nowadays electronic image sensor sensitivity) has been defined so that when doubling the ISO, the film sensitivity doubles, so that the quantity of light fixed on the film or image sensor per second doubles. Taking the base ISO 100, the ISO 200 doubles the quantity of light captured per second, ISO 400 quadruples it, and so on for ISO 800, 1600, 3200 and 6400 as found on the ISO dial of figure 4. So the contribution of the ISO sensitivity I to the quantity of light captures by the sensor per second is $\frac{I}{100}$. Moreover doubling the ISO doubles the quantity of light captures per second, that is, corresponds to one stop.

34.12 Effect of the Exposure Time (Shutter Speed) on the Quantity of Light Captured by the Sensor Per Second

The shutter speeds on the dial of figure 5, are $\frac{1}{4000}$, $\frac{1}{2000}$, $\frac{1}{1000}$, ..., $\frac{1}{125}$, $\frac{1}{60}$, ..., $\frac{1}{15}$, $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{2}$, 1, 2, 4, 8, being each time multiplied by 2 (or so for $\frac{1}{125} \to \frac{1}{60}$ and $\frac{1}{15} \to \frac{1}{8}$ as well as $\frac{1}{n}$ written n to ease engraving of shutter speed on the dial, but the camera software that reads the dial positions can use the exact shutter speed values).

The quantity of light captured by the image sensor is proportional to the exposure time (shutter speed) s. This is the quantity received during one second multiplied by s so is of the form $c_s s$ where c_s is the quantity of light captured during one second. It follows that changing the shutter speed by one stop down double the quantity of light