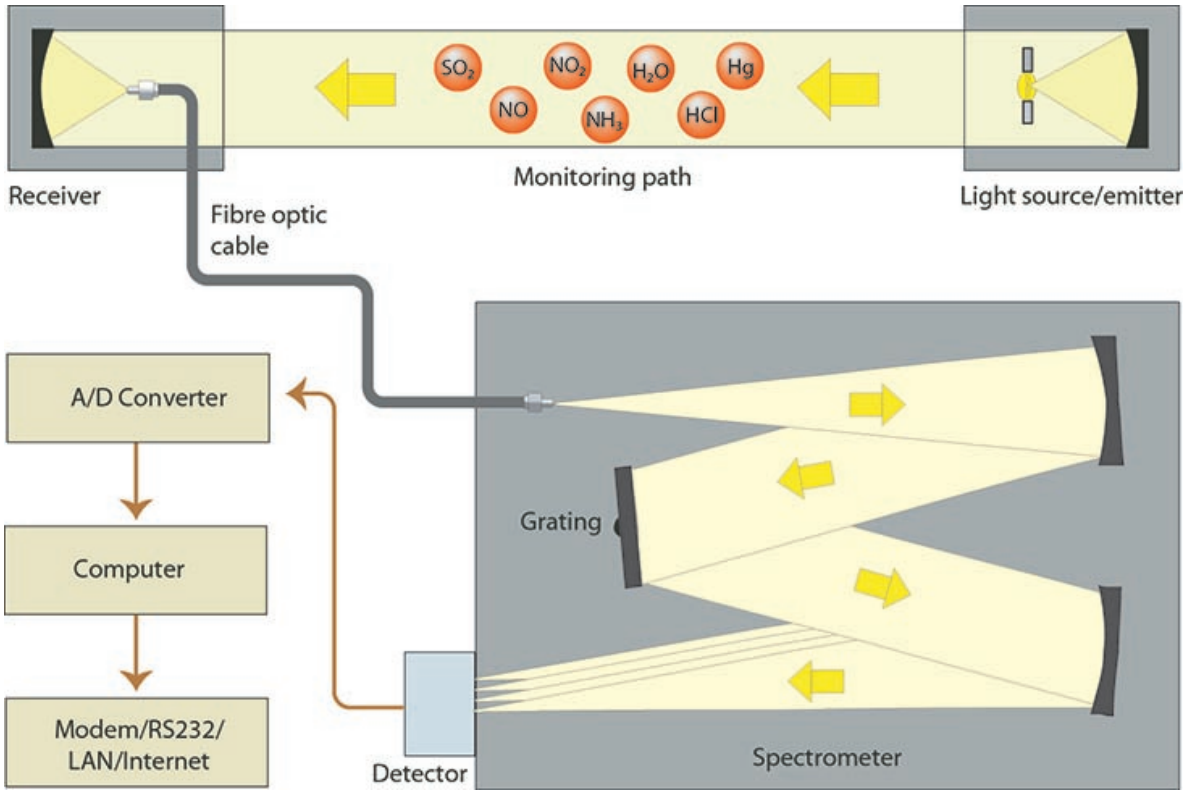
UV DOAS TECHNIQUE



The basis of the principle used by OPSIS to identify and measure concentrations of different gases is scientifically well established: Differential Optical Absorption Spectroscopy (DOAS), which is based on Beer-Lambert's absorption law. It states the relationship between the quantity of light absorbed and the number of molecules in the lightpath.

Because every type of molecule, every gas, has its own unique absorption spectrum properties, or "fingerprint", it is possible to identify and determine the concentrations of several different gases in the lightpath at the same time.

DOAS is based on transferring a beam of light from a special source – a high-pressure xenon lamp – over a chosen path and then using advanced computer calculations to evaluate and analyse the light losses from molecular absorption along the path. The light from the xenon lamp is very intense, and includes both the visible spectrum and ultraviolet and infrared wavelengths.

The light is captured by a receiver and conducted through an optical fibre to the analyser. The fibre allows the analyser to be installed away from potentially aggressive environments.

The analyser includes a high-quality spectrometer, a computer and associated control circuits. The spectrometer splits the light into narrow wavelength bands using an optical grating. This can be adjusted so that an optimum range of wavelengths is detected.

The light is transformed into electrical signals. A narrow slit sweeps past the detector at high speed, and a large number of instantaneous values are built up to form a picture of the spectrum in the relevant wavelength range. This scan is repeated a hundred times a second, and the registered spectra are accumulated in the computer's memory while awaiting evaluation.

The absorption spectrum just registered from the light path is compared with one calculated by the computer. The calculated spectrum consists of a well-balanced summation of the reference spectra for the analysis concerned.

The computer proceeds by varying the size factors for each reference spectrum until it reaches the best possible match. From this the different gas concentrations can be calculated with high accuracy