3.6 Raman Cells

Raman shifters are suitable for a frequency conversion of fixed or tuneable laser sources and for the suppression of amplified spontaneous emission (ASE) and are based on stimulated Raman-scattering (SRS). The most commonly used gases for this purpose are H2, D2, O2 and N2. SRS is a flexible, economic and easy to handle wavelength extension method.
In addition, tuneable radiation down to 150 nm can be generated if the pump (dye laser) radiation provides sufficient high energy (= 30 mJ) and good focusability. Starting in the visible or ultraviolet with tunable dye laser radiation, the complete spectral interval down to 150 nm is accessible **without gaps** by using different dyes.

The conversion efficiencies are more than 20% for the first Stokes and around 5% for the first anti-Stokes component. The efficiencies for higher order anti-Stokes components scale approximately with:

$$AS_{n+1} \sim ASn \times 0.3 \text{ for } n > 1$$

Continuous tuneable radiation from 190 nm (anti-Stokes generation) up to the far infrared region (Stokes generation) can be generated by using one Raman cell and one non-linear medium (e.g. H2).
Vacuum-flanges to connect the Raman cell to a vacuum vessel can be ordered from Radiant Dyes.

RD-RS RAMAN-Shifter Construction kit

The Set contains:
Cylindrical stainless steel gas pressure cell (approx. 1.20 m) with end flanges.
A positive quartz lens is used as entrance window, a quartz plate as output window.
The set contains also: A quartz collimating lens, one input (gas-in)
and one output (to vacuum pump) valve, one pressure gauge (0 - 40 bar),
one adjustable pressure relief valve adjusted to max. 40 bar and mounting equipment to fasten the cell upon an optical table.
All components are made of stainless steel.
All connections are standard Swagelok parts.
The Raman-cells are pressure tested by Radiant Dyes.
This and the automatic pressure relief valve minimises potential hazards.

The RAMAN-Cell must be installed in an explosion proofed housing.
We take on no responsibility for accidents because of improper use.

(Photo without housing)