Modulated He-Ne laser 0,5-1 mW

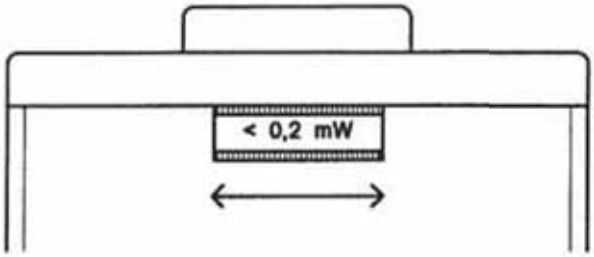
The laser is a source of light, emitting red light on a wavelength of 632.8 nanometer. The emitted light is coherent i.e. the particles of light are all in phase. The laserlight consists of light particles emitted in one direction as a narrow beam of light, with a beam diameter of approx. 0.49 mm – the beam diameter will vary depending on the distance from the laser. The light is unpolarized, it will thus vary spontaneously and at random around the longitudinal axis. Laser light as such is of no greater danger than ordinary light beams, but due to extraordinary physical characteristics the light can be concentrated to very narrow beams with a very high intensity (energi) per square unit.
This phenomenon indicates that laser light must be handled with great care. Concerning small lasers (up to 5 mW) the danger involved is limited to a question of damage to the retina. If the laser beam is carelessly directed into the eye, the retina may be damaged due to the high energy beam spot.

Caution:

Class 2 laser (I.E.C. 825)
Do not stare into beam!
Laser beams can burn the retina and cause permanent damage to the human eye. Be carefull not to allow laser beams or reflected beams to be directed towards the eye.

The Grey-filter

This laser has been developed especially for educational purposes which will entail varying arrangements and demonstrations which in turn may enlarge the risk of eyedamage. To minimize this risk the laser has been equipped with a grey-filter offering the opportunity of reducing the light to approx. 10% of the full intensity. This reduction will minimize the risk substantially without hindering adjustment of the laser when setting up new arrangements.
When new arrangements have been set up and adjustment has been made, simply open up the filter. The grey-filter is placed in a hinged holder immediately before the light aperture in the front panel of the laser.
By turning the wheel the laser can be adjusted to maximum "1 mW", 10% of full power "0.2 mW" or "Closed".



The Helium-Neon Laser is a compact and robust instrument with an output power of 0.5 - 1.0mW (typically 0.9 mW). The laser is extremely easy to handle in the laboratory due to its compact yet robust construction. The laser can be placed directly on a solid surface or it can be mounted in an optical bench or similar arrangements. The laser is delivered with 2 steelrods to secure a stable mounting, the 2 steelrods can be mounted in the threaded holes in the bottom of the cabinet. The laser can now be mounted in an optical bench for maximum stability.
The aperture in the laser's frontpanel is equipped with an internal threading for the mounting of lenses. In order to disperse the laser light a lens can be mounted in the aperture, e.g. a lens from an ordinary microscope. The standard threading allows the use of microscope lenses from a great number of makers. To make holograms a lens with a 40x magnification is recommended.

The laser comprises a glass-sealed tube with integral mirrors. The sealant used for the fixation of the integral mirrors is a glass-compound with a very low melting point. Conventional laser tubes with organic sealants such as epoxy- or siliconeresin will in turn lead to displacement of the Helium-Neon mixture resulting in a very limited working life.
The advantages of the glass-sealed laser tubes means a long storage life. The laser requires no regular running to maintain tube operation and working life (est. durability 10.000 hrs).

Caution high voltage:

Removing the laser cabinet gives direct access to High Voltage circuits.
Beware, due to the use of built-in capasitors High Voltage may be present even after the laser has been turned off!

Operation:

1. Connect the power cable to the mains outlet (230 V, AC).
2. Switch the laser on by turning the key switch clock wise, then the pilot lamp is lit and the laser beam is emitted from the aperture in the front panel.

Note: Debiliation of the laser beam is an indication of a lowering of the mains supply voltage or too high modulation signal.

Trouble-shooting:
If your laser does not work please check the following:

1. Make sure that the laser aperture is open:
   "<0.2 mW" or "1 mW".
2. Check the mains supply voltage.
3. Check whether the fuse is blown or the cap just not tightened.

Modulation:
The laser can be modulated, as the intensity of the laserbeam can be weakened proportionally by means of a signal. The signal source is connected to the laser via the BNC-terminal in the laser's rear panel. This facility is extremely well suited for the demonstration of transmission of signals via light, either through air or through optical fibre cables. Achieving the full advantage of this facility requires a photoelectric unit with a built-in amplifier (e.g. the demodulator 1656-10).
Modulation of the laserbeam can be done for instance by connecting a (portable) radio or a diskman to the lasers input terminal (the BNC-terminal). The best connection is established by connecting the walkmans headphone terminal to the laser's BNC-terminal. Connection can also be established via the loudspeaker socket, but increasing the volume too much will lead to distortion.

For the purpose of achieving the most convincing results, this laser has been equipped with a stabilized power supply with an extremely low noise level.
Beware of magnetic fields:
Unfavourable circumstances can cause the lasertube to self-oscillate which in turn will increase the noise level. Self-oscillation can arise if the lasertube is influenced by strong magnetic fields. For that reason it is advised to remove any magnets from the laser's vicinity. The laser itself comprises iron parts which can function as permanent magnets even after removal of any possible sources of magnetism. The remanent magnetism can cause the lasertube to self-oscillate, but is easily eliminated by means of an external AC-coil.

Technical Specifications:

Mains-supply:	230 V AC ±10% 50/60 Hz.
Fuse:	125 mAT.
Output:	0,5 – 1 mW without the grey-filter, <0,2 mW employing the grey-filter.
Output wavelength:	632.8 nm (red).
Beam diameter:	0,49 mm.
Beam divergence (full angle):	< = 2.0 mrad.
Spatial Mode:	TEM_{00}
Output polarization:	Random.
Longitudinal mode spacing:	1058 Mhz.

Output power stability: ±5% in 24 hrs. at a constant line voltage, excluding longitudinal mode sweeping contributions.
Warm-up time: More than 50% of the normal output when switched on, full output within 15 min.

Amplitudinal noise <5% (receiver without filter).

Amplitudinal noise <1% (receiver with filter).

Modulation:

Degree of modulation:	10-15%.
Input socket's impedans (the BNC-terminal):	47 kOhm.
Modulation signal:	0-1 V_{pp}
Frequency range approx:	400 Hz to 16 kHz - 3dB
Frequency range approx:	150 Hz to 35 kHz -6dB

Dimensions:

(height x width x length):	80 x 360 x 75 mm
Weight:	2 kg.

Storing Conditions:

Working temperature:	0°C – 50°C.
Storing temperature:	-20°C – +60°C.
Humidity:	0 – 95%.