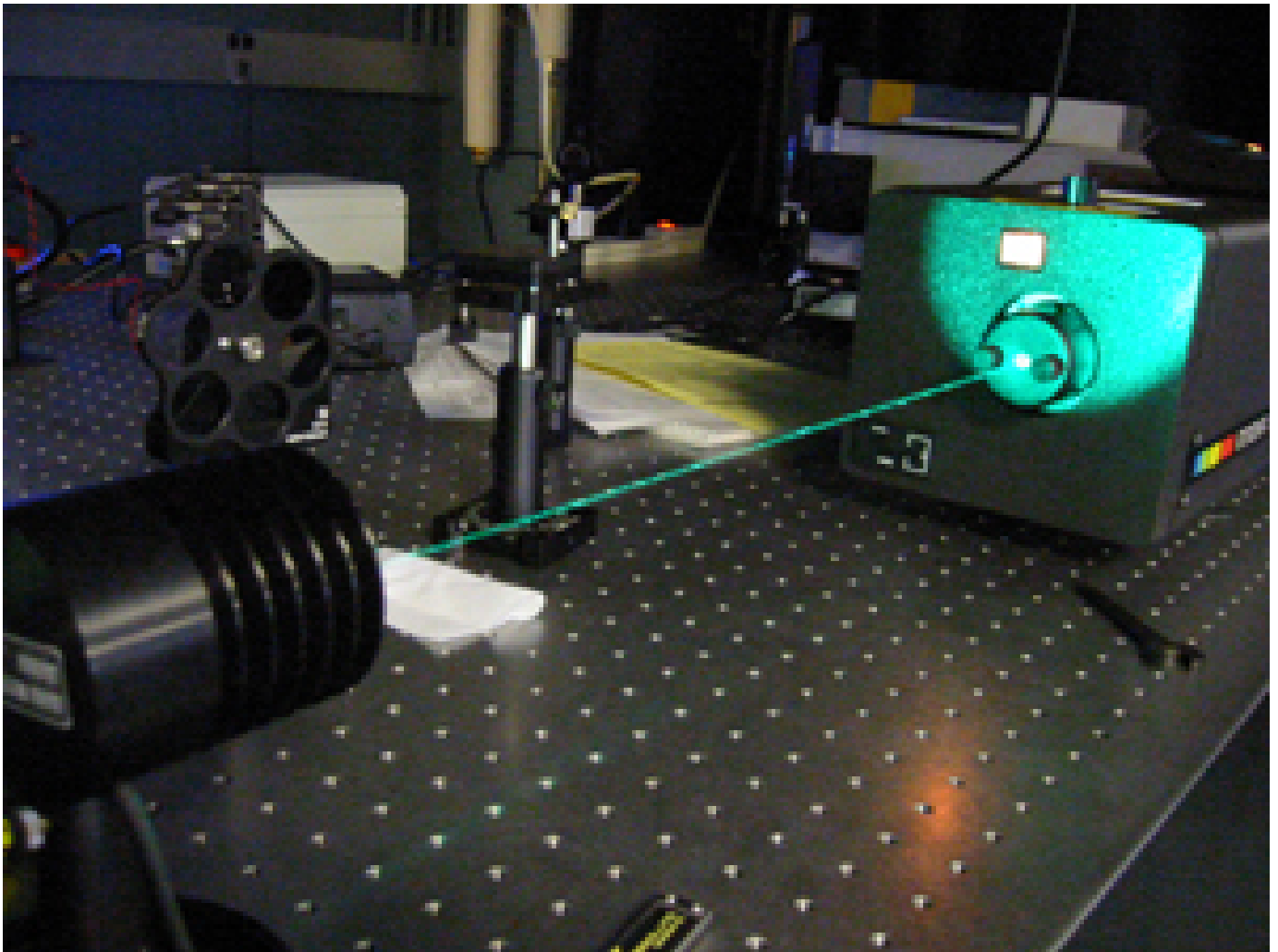


Physiological Institute



PHYSIOLOGICAL INSTITUTE

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18th of December 1996

Test of the electronic water-treatment system VULCAN 5000 for the cooling system of the laser Innova 90-K of the company Coherent GmbH (user report)

Dear Mr. Christiani

Referring to our telephone call on the 18th of December 1996 I would like to send you a description of our trial of your electronic water-treatment device Vulcan 5000.

The system Vulcan 5000 was installed at the end of March 1996 in the coolant inflow of a crypton gasions laser Innova 90-K manufactured by the company Coherent GmbH, supplied with water from the system of mains, to reduce or even avoid lime deposits on the ceramic covering of the laser tube (see picture, enclosure). Over the past years we constantly had difficulties with laser tubes which were not in working order any more and consequently had to be replaced due to thick lime deposits on the ceramic of the tubes through which the coolant flows with approx. 9 l/min and a pressure of approx.2,5 bar and at the same time heats up to a temperature between 60°C and 70°C depending on the gas discharge electricity (tube electricity) between 30 A and 40 A.

The system Vulcan 5000 is an economic alternative to expensive heat exchangers, i.e. closed circulations of coolant with treated water. These heat exchangers cost about 5.000 €. The device Vulcan 5000 has been used on a trial basis since the end of March 1996 to treat the coolant of our gas laser. On the 12th of December 1996 the company Coherent GmbH checked the laser tubes for lime deposits on the ceramic surface. No lime deposits were detected, therefore it is all in all a positive result (see service report of the company Coherent GmbH, enclosure).

During the test period the laser was in operation approx. 200 hours with a laser tube electricity ranging from medium to maximum and with operation times between four and eight hours. These operation periods and the accomplishment required correspond to the normal use of the laser in our fluorescence microscopic experiments. Laser tubes previously used in a similar way, which worked without a treatment of the coolant, showed considerable lime deposits.