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Operating instructions

Fig. 1: 08120.01 ... 08120.14 Spectral lamps.

CONTENTS

1 SAFETY PRECAUTIONS

- Carefully read these operating instructions before operating the spectral lamps. This is necessary to avoid damage to it, as well as for user-safety.
- Use spectral lamps only in combination with a lamp holder of type Pico 9 (08119.00) or an experimental lamp (11615.05), together with a power supply of type (13662.9X*).
  Please read the corresponding operating instructions for these articles.
- **Do not connect the two 4 mm plugs of the connecting leads directly to the electric mains supply!**
  Danger of explosion!
- Only use the lamp in the vertical position with cap attached.
- The metal covering cap can heat up considerably during longer usage and is therefore not to be taken off before it has had an appropriate time to cool, usually approx. 15 minutes.
- Lamp replacement must be made in a dead condition, i.e. the two 4 mm plugs of the connecting leads must be completely drawn out from the pair of sockets of the operating voltage supply.
- Before applying the mains voltage, check that the earth lead is properly connected to the mains earth lead. The mains plug is only to be plugged into a mains socket with earth lead. Do not abolish the protective effect by using an extension cable without earth lead.
- Check that the mains voltage stated on the type plate of your power supply matches that of your electric mains supply.
- Set up the experimental arrangement so that the power supply and instrument plug are freely accessible. Do not cover up the venting slots of the experimental set-up.
- Only use the experimental set-up for the use it is intended for.
- Do not open up anything in the experimental set-up.
- Do not connect any other pieces of equipment other than those specified to the instrument.
- Caution: The instrument must be separated from the mains before any cable connection is loosened, exchanged or removed!

Fig. 2: Power Supply for Spectral lamps with connected spectral lamp; lamp mounted in Pico 9 socket, with rod held in a barrel base.

2 PURPOSE AND CHARACTERISTICS

Spectral lamps should emit a characteristic line spectrum with as high a luminance as possible. They are used at low pressures and temperatures to avoid dispersion of the spectral lines that would otherwise be caused by pressure and temperature. The volume emitted is kept small so that the imaging optics can be simply constructed. In contrast to spectral lamps, lamps that are optimized for a high light yield, e.g. for lighting purposes, are used at high pressures and temperatures.

Spectral lamps are gas discharge tubes with hot electrodes that work at low pressures, the characteristic line spectra of which (see Fig. 3) are determined either by a noble gas or by a metallic vapour. The spectra that are emitted are distinguished by their high and constant luminous density and their spectral purity. With the exception of the noble gas lamps (He and Ne), their complete radiation power is first reached after a warm-up time of some minutes. The discharging mechanism of spectral lamps corresponds in principle to arc discharge, i.e, high current density as well as small cathode drop with a resulting low lamp voltage (U_B = 10 ... 60 V~).

The metallic vapour lamps always contain, in addition to the metal concerned, a starting gas (noble gas) with a filling pressure of several Torr, in which the discharge ignites, first as glow discharge but then immediately as an arc discharge. The metallic vapour plays no part in this, as the vapour pressure of it is too low. Even in a burnt-in condition (plasma temperature at a height of around 300°C) the vapour pressure of sodium, for example, is only approx. 10^{-2} Torr. On ignition, the plasma glow is first only determined by the starting gas, then, as the plasma temperature increases, the typical luminous effects of the metallic vapour appear. That this should occur at all, despite the relatively low metallic vapour pressure, is because there are a number of slow electrons in the plasma whose energy may well be sufficient to excite the metallic vapour but not to ignite the starting gas. Even in the burnt-in condition, however, the presence of the starting gas is necessary to maintain the ionization required for discharge in the cathode drop.

Spectral lamps consist of a glass or quartz discharge tube that is held in a protective glass outer bulb. When required for an emitted spectral range, the outer bulb is made of a special glass that is transparent up to 280 nm. The Hg lamp has a light outlet opening in the outer bulb. Spectral lamps of the 08120.01... 08120.14 series are constructed for use with a Pico 9 lamp holder (08119.00) or an experimental lamp 6 (11615.05), together with a choke ballast for spectral lamps (13662.9x*) as ballast.

Spectral lamps have a distinctive base with which they are fitted on their lamp holder.

The nominal current intensity for all lamps in this series is 1 A (+10 % - 5 %).

Higher or lower current intensities lead to a reduction in their service life or destruction of them.

The operating instructions for choke ballast 13662.9x and for lamp holder 08119.00 must be observed.

3 HANDLING

Do not touch the bulb of the lamp with your bare hands - hold onto the base of it - otherwise residues will be burnt into the hot surface.

The permissible position for usage is standing vertically.

4 TECHNICAL SPECIFICATIONS

Article-No.	Type	Burner	Operating voltage / V	Power/ W	Light intensity / cd	Luminous area / mm²	Luminance / cd/cm²
08120.01	Cd	Quartz	15	15	1.2	15 x 6	2
08120.03	He	Glass	60	55	2	15 x 8	1.5
08120.07	Na	Glass	15	15	40	15 x 6.5	15
08120.08	Ne	Glass	30	30	3.5	15 x 8	1.5
08120.11	Zn	Quartz	15	15	0.5	15 x 6	0.7
08120.14	Hg	Quartz	50	40	50	20 x 6	50

Nominal current for all types: 0.95… 1.10 A

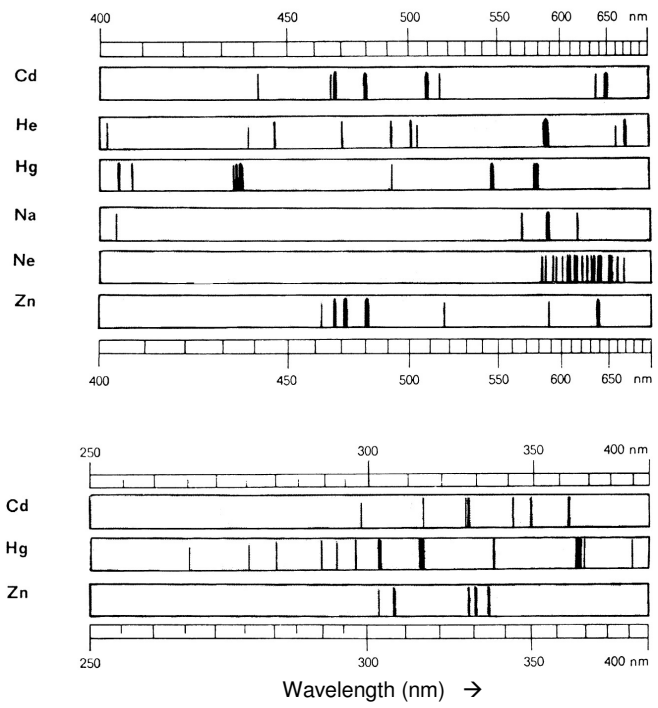

Fig. 3: Spectra produced by spectral lamps.

5 LIST OF EQUIPMENT

Lamp holder, pico 9, for spectral lamps	08119.00
Experiment lamp 6	11615.05
Power supply for spectral lamps	13662.9x*

*Voltage and frequency (see type plate) depending on local power grid:

115 V~ / 60 Hz:	x = 1
115 V~ / 50 Hz:	x = 2
230 V~ / 60 Hz:	x = 4
230 V~ / 50 Hz:	x = 7

Special voltages and fixed frequencies on request.

6 NOTES ON THE GUARANTEE

We guarantee the instrument supplied by us for a period of 24 months within the EU, or for 12 months outside of the EU. Excepted from the guarantee are damages that result from disregarding the Operating Instructions, from improper handling of the instrument or from natural wear.

The manufacturer can only be held responsible for the function and technical safety characteristics of the instrument, when maintenance, repairs and alterations to the instrument are only carried out by the manufacturer or by personnel who have been explicitly authorized by him to do so.

7 WASTE DISPOSAL

The packaging consists predominately of environmentally compatible materials that can be passed on for disposal by the local recycling service.
Please contact your municipal administration for information on the disposal of instruments.