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### Operating instructions

**CE** The unit complies with the corresponding EC guidelines.



Fig. 1: Lamp, f. 50 W Hg high press. lamp 08144.00

## 1 SAFETY PRECAUTIONS



- Carefully read these operating instructions completely before operating this instrument. This is necessary to avoid damage to it, as well as for user-safety.
- Only use the instrument in dry rooms in which there is no risk of explosion.
- Only use the instrument for the purpose for which it was designed.

## 2 PURPOSE AND DESCRIPTION

This experimenting lamp is equipped with an extra high pressure mercury vapour tube 08144.00 and is used as a light source of extremely high intensity and luminous density, with a high proportion of UV light (due to a quartz glass bulb and a quartz glass safety pane). Thanks to this, it can be used universally for experiments in the field of optics and for projections. Together with interference filters (cf. list of accessories), one obtains an intense monochromatic light source.

Thanks to the 10 mm round section rod (1), the lamp can be easily be fixed to all supports or to optical benches. The distance between the end of the rod and the middle of the light exit orifice is 180 mm (this fits all PHYWE accessories for optical benches).

The casing of the lamp is designed so as to obtain the optimal temperature for the operation of the mercury vapour tube. Two microswitches automatically cut the power from the leads which can be touched when the casing is opened.

**Hint:** even so, the lamp must be unplugged before opening the casing.

For reasons of safety, the lamp emits a divergent light beam if no condenser lens is fitted. The flange at the light emission orifice can take condensers with the focal distances  $f = 60$  mm (PHYWE 08137.00),  $f = 100$  mm (PHYWE 08137.01) and  $f = 200$  mm (PHYWE 08137.02). The  $f = 60$  mm condenser lens can be moved in the flange, allowing to obtain a parallel or a convergent beam.

**CAUTION:** when not being used, the  $f = 60$  mm condenser lens may not remain on the lamp (danger of ignition at the focus when the lamp is switched on again)!



Two knobs allow to adjust the lamp to the experimental set up and to compensate tolerances. These knobs allow to move the lamp laterally and vertically without problems. The maximum translation in each direction is  $\pm 5$  mm.

The lamp has a fixed power cable with a special 4 pole plug to connect it to the Hg-50 W ballast power supply (PHYWE 13661.97), the use of which is imperative. Operation with other power supplies is not permissible.

## 3 NOTES ON OPERATION

This high-quality instrument fulfills all of the technical requirements that are compiled in current EC guidelines. The characteristics of this product qualify it for the CE mark.

This instrument is only to be put into operation under specialist supervision in a controlled electromagnetic environment

in research, educational and training facilities (schools, universities, institutes and laboratories).

## 4 HANDLING

### 4.1 Safety indications

The lamp may only be used under the supervision of a competent person. It may only be operated by specially trained personnel, which must be conversant with the operating instructions and the relevant safety instructions.

The lamp is operated by means of a 50 W extra high pressure mercury vapour tube. Such a high pressure discharge tube may cause a health hazard due for example to:

- parts under high voltage which might be touched,
- splintering in case the lamp bursts, because during operation, an interior pressure of up to 7 MPa (70 bar) is achieved. When the lamp is cold, pressure is smaller than 150 kPa (< 1.5 bar), so that its use causes no particular risk.
- high luminous density, IR and UV radiation. If the beam hits the skin directly, it may cause redness or even burns ("sunburn", enhancement of cancer of the skin). It may also damage the eyes (retina, lens, iris, cornea).
- formation of ozone (O<sub>3</sub>) or other noxious gases or vapours (e.g. NO<sub>2</sub>).

For this reason, the following protective measures have been taken:

- avoiding direct exit of light from the casing by design – light can only exit through the foreseen orifice,
- ventilation orifices are covered so as to prevent injuries through splinters in case the lamp should burst,
- use of a quartz glass safety pane as a protection against splinters and to prevent touching of parts which may be under dangerous voltage,
- the lamp is equipped with safety switches which automatically switch it off in case the casing is opened,
- protective earthing of the total casing,
- the casing lid can only be opened with a tool (2 mm Allen wrench), so as to prevent opening by mistake,
- the adjustment elements (knobs) are easily reached from outside without opening the casing.

The user must observe the following indications:

- operating time should not be unnecessary long, in order to assure protection against noxious gases; the room must be well ventilated; the user must not keep his head directly over the ventilation orifice.  
(Due to relatively low power of the lamp, noxious emissions are rather low).
- Skin should not be submitted unprotected directly to the strong light beam. Never look into the beam. Experimental set-up must be such that no one can look directly into the beam.

Furthermore, heating occurs, which is typical for projection lamps. This may lead to fright reactions if casing is touched inadvertently. Heating may even cause burns in the upper casing area.

The lamp should thus be handled bearing in mind that it is hot. If necessary, protective gloves should be used.

If the tube must be changed or repairs are necessary, the lamp must be left to cool down until the high pressure has decreased to the point where no risk of explosion remains.

For this reason:



**CAUTION:** always wait for at least 15 minutes after switching off the lamp before opening the casing.

Should the lamp be dropped, or if any damages are apparent, the lamp may not be used but must be sent at once to the authorised service workshop to be checked.

The quartz safety pane must be changed at once in the following cases:

- if evident damages such as chipping are to be seen,
- if the surface of the pane is severely scratched,
- if the lamp inside the casing has burst and splinters have damaged the pane.

### 4.2 Start-up

Before the first start-up, the provided 50 W extra high pressure mercury vapour tube must be inserted (cf. "Inserting and exchanging the tube").

Basically, the lamp must be operated in a vertical position. For this, the rod attached to the lamp casing must be fitted to a support or to a slide on an optical bench so that the rod points downward.

Connect the experimenting lamp to the Hg-50 W ballast power supply (PHYWE 13661.97). Switch on the lamp by means of the main switch at the back of the ballast power supply. After a few seconds, the lamp begins glowing faintly; full luminous power is reached after about 3 minutes.

If necessary, the lamp can now be adjusted vertically and horizontally by means of the adjusting knobs.

**CAUTION:** after switching on, the lamp may not be switched off before 15 minutes. Shorter burning periods will reduce the lifetime of the tube.



After switching off the lamp, it may only be switched on again after it has cooled off (approximately 15 minutes).

If the lamp does not burn after 20 seconds (uninterrupted clicking of the starter in the ballast power supply), immediately switch off the ballast power supply with the main switch. Please consult "possible problems" to see whether you can solve the problem by yourself. Please consult the operating instructions of the ballast power supply too.

### 4.3 Setting in and replacing the tube

During transport, a cardboard tube of the same dimensions as the tube is set in place of the latter. Its purpose is to hold the lamp socket and to avoid short circuits in case the lamp is connected without tube to the ballast power supply.

The following elements are required:

- 2 mm Allen wrench (supplied with lamp),
- approximately 5 mm wide flat screw driver,
- 50 W extra high pressure Hg vapour tube (PHYWE 08144.10, supplied with lamp)

**CAUTION:** before switching on, all the poles of the lamp must be disconnected (either by screwing off the tube plug socket or by pulling out the mains plug!)



- Fix lamp in support.
- Unscrew screws (2) (3 screws) on the front side with the Allen wrench and remove the lid by pulling it forward.

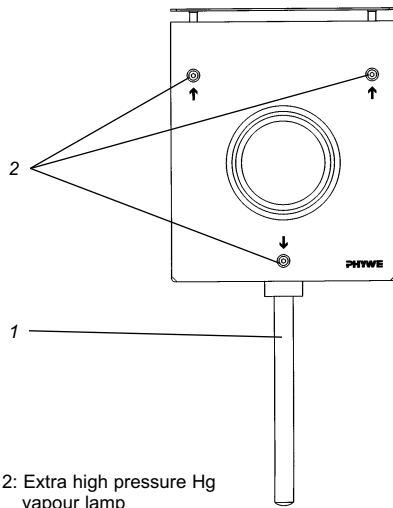


Fig. 2: Extra high pressure Hg vapour lamp

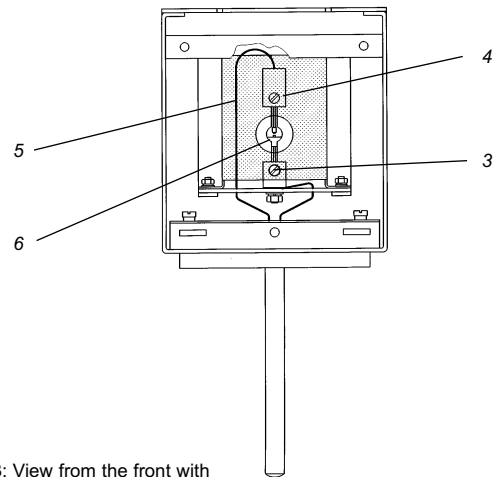


Fig. 3: View from the front with removed lid

- Unscrew clamping screw (3) on the lower lamp socket and remove cardboard tube from the socket. Hold the upper socket whilst doing this.
- Unscrew clamping screw (4) on the upper socket and remove cardboard tube.
- Remove 50 W Hg-vapour tube from its package without touching the quartz tube, if not finger prints will burn in at once during operation, absorbing light and reducing the luminosity of the lamp. The tube can be cleaned with alcohol and distilled water.
- Set tube into the upper socket (with connecting cable) in such a way that mirror coating (6) of the lamp will be on the lower side and carefully tighten clamping screw (4), without exerting lateral forces on the tube (tube might break).
- When an HBO Osram lamp is used (characterized by a reflecting surface at burning zone height), then fit it in so that, from a top view, the labelling is the right way round and the reflecting surface is at the back.
- Inspect quartz tube for impurities and clean if necessary.
- Introduce quartz tube into the lower socket and make sure that connecting lead (5) neither touches the lamp tube nor interferes with emitted light.
- Carefully tighten clamping screw (3) on the lower lamp socket.
- Check that the lamp is well in its place and that mirror coating (6) is below-
- Push on lid and fasten by means of the three Allen screws (2).
- Keep cardboard tube carefully for later transport.

#### 4.4 Servicing

- Occasionally check insulation.
- Occasionally check contacts between lamp tube and the sockets and clean contacts.
- Check blackening of lamp tube and exchange at the latest after the average lifetime of 100 h.

**CAUTION:** the 50 W extra high pressure mercury vapour tube should not be used longer than the average lifetime of 100 h, because increasing blackening decreases the strength of the quartz tube, thus rapidly increasing the risk of explosion.



## 5 POSSIBLE PROBLEMS CAUSING FUNCTION FAILURES

**Symptom** → *cause of problem* → *corrective action*  
**Control lamp on the ballast power supply does not light up** → *ballast power supply is not properly connected to mains / ballast power supply fuse burnt / main switch at the back of the ballast power supply is not switched on* → connect properly / replace fuse / switch on main switch.

**Lamp does not light up (1)** → *starter is broken or has been triggered, it must make a clear clicking sound when the connecting cord to the lamp is pulled off. CAUTION! do not test longer than 10 seconds (overload risk)* → press red button on the starter and try again; if necessary, replace starter (only use PHYWE 166973 safety starter).

Hint: if the ballast power supply is operated without lamp, the safety switch on the starter is triggered after about 30 seconds, switching off the device so as to protect it against overload.

**Lamp does not light up (2)** → *lamp casing is not properly closed, safety switches in the casing do not allow lamp to be switched on* → check whether casing is properly closed and screwed tight (slight clicking of both safety switches). Close casing correctly and screw it tight.

**Lamp does not light up (3)** → *no contact at tube sockets / loose screw fastenings, corrosion on contacts* → clean, slightly tighten screws.

**Lamp does not light up (4)** → *lamp is used up (electrodes in the tube are burnt, tube is blackened)* → replace lamp tube (PHYWE 08144.10).

If no further obvious problem could be detected, please contact our service.

## 6 SPECIFICATIONS

Voltage	alternative voltage
Lamp supply voltage	$\geq 198$ V
Lamp burning voltage	$42 \pm 4$ V
Lamp current	1.3 A
Nominal lamp power	50 W
Light current	2000 lm
Light intensity	230 cd
Light density	30000 cd/cm <sup>2</sup>
Length of arcing	1 mm
Half-width	0.3 mm
Starting time	3 min
Average lifetime	100 h
Burning position	vertical, $\pm 15^\circ$ casing rod pointing downwards
Casing dimensions (mm)	approx. 134 x 118 x 151
Weight	approx. 2.5 kg

## 7 LIST OF ACCESSORIES

To operate the lamp, the following is required:

Ballast power supply for Hg-50 W 13661.97

A condenser from the list of accessories below.

Recommended accessories:

Double condenser,  $f = 60$  mm 08137.00

Simple condenser,  $f = 100$  mm 08137.01

Simple condenser,  $f = 200$  mm 08137.02

Set of interference filters (578, 546, 436 nm) 08461.00

Set of interference filters (405, 366 nm) 08463.00

*Replacement part*

Mercury high pressure lamp 50 W 08144.10

## 8 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.

## 9 WASTE DISPOSAL

The packaging consists predominately of environmentally compatible materials that can be passed on for disposal by the local recycling service.



Should you no longer require this product, do not dispose of it with the household refuse. Please return it to the address below for proper waste disposal.

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