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INSTRUCTION MANUAL OF UV TRANS-ILLUMINATOR

GLOWORM - 2

(NEW CAT NO. TIGWR-0AP602/ TIGWR-0AP603)
(OLD CAT. No. 31-60002 OR CAT. No. 31-60003)

GLOWORM - 4 MINI

(NEW CAT NO. TIGWR-0AP404 /TIGWR-0AP405/ TIGWR-0AG404 / TIGWR-0AG405)
(OLD CAT. No. 31-61002 /CAT. No. 31-61003/ 31-61A02/ 31-61A03)

GLOWORM - 4

(NEW CAT NO. TIGWR-0AP404 /TIGWR-0AP405/ TIGWR-0AG404 / TIGWR-0AG405)
(OLD CAT. No. 31-61004 OR CAT. No. 31-61005)

GLOWORM - 6

(TIGWR-0AP606
OLD CAT. No. 31-61006 OR CAT. No. 31-61007)

GLOWORM - 8

(CAT. No. 31-62008 OR CAT. No. 31-62009)

GLOWORM - 10

(CAT. No. 31-62010 OR CAT. No. 31-62011)

Manufactured and Marketed by:

TechResource
Scientific Pvt Ltd

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Tel: 9819095429

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Dear Customer,

*Congratulations on procuring the **Gloworm**!*

The Gloworm is a robust and flicker-free UV-trans-illuminator specially designed and manufactured for biotechnology laboratories.

*The Gloworm range of trans-illuminators is very **sensitive** and on par with imported models. Our trans-illuminators are **safe** for use and enable management even by undergraduate students and, most importantly; are very **economical**.*

*A post-fluorescence chroma-filter absorbs the UV light and the violet blue light to give the same high sensitivity in addition to the inherent safety characteristics of **UVA** light.*

*The trans-illuminator is indigenously manufactured with high-quality components and is specifically designed to suit Indian laboratory conditions. It works on an integrated circuit controlled electronic ballast which gives a **flicker free** result. There is a provision for a **high and low intensity** controller. The small foot print enables it to fit easily on a work bench.*

This trans-illuminator will give you many years of trouble-free use. In any event that there is a problem our long warranty of 3 years covers all manufacturing defects.

We sincerely hope you that you gain as much satisfaction in using this trans-illuminator as we achieved in designing and manufacturing it.

Regards,

The Production Team of TechResource

Precautions:

1. Keep the trans-illuminator dry at all times.
2. Avoid using when the input AC voltage has fluctuations.
3. Please read the manual carefully before using the trans-illuminator.
4. Do not use Alcohols or other cleaning agents to clean the filter on the window of the transilluminator.

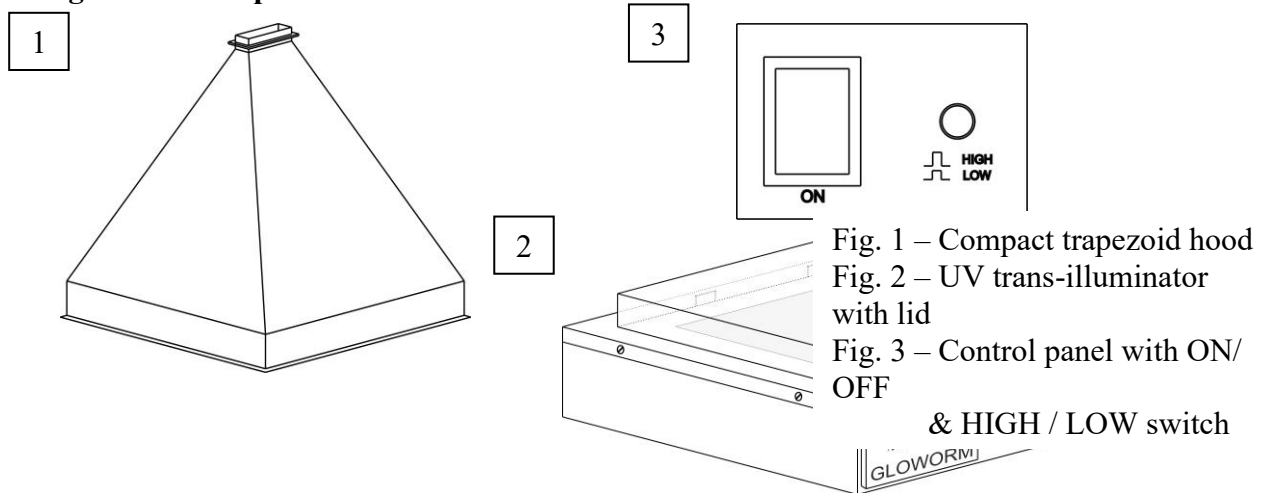
Check before installation

A. Check for any physical damage to the trans-illuminator that may have occurred in transit
B. Check the mains supply with a multi-meter for proper and correct voltage (within limits 220 – 245 V)

C. Functionality test

1. Connect the trans-illuminator through a stabilizer to the mains and switch it ON via the mains switch on the front
2. Upon activating the trans-illuminator unit, the UV tubes will start glowing

Note: To ensure long life of the ballast and UV lamps connect the trans-illuminator to a stabilizer.

Diagrammatic representation of the Gloworm

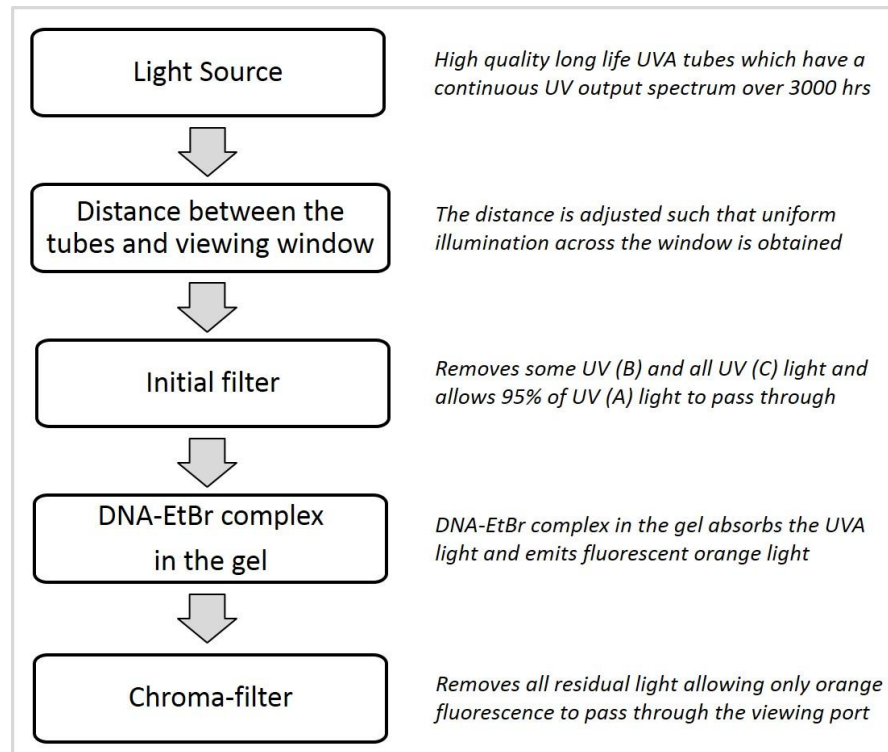
Complete Specifications:

Model	GLOWORM-2	GLOWORM-4 mini	GLOWORM-4	GLOWORM-6	GLOWORM-8	GLOWORM-10
Number of UVA tubes	2	4	4	6	8	10
Lamp life	3000 hrs	3000 hrs	3000 hrs	3000 hrs	3000 hrs	3000 hrs
Output wavelength: (radiation peak in nm)	315-400 nm (352 & 368)	315-400 nm (352 & 368)	315-400 nm (352 & 368)	315-400 nm (352 & 368)	315-400 nm (352 & 368)	315-400 nm (352 & 368)
Total tube wattage (No. of tubes x watt/ tube)	12 Watt (2 x 6 W)	16 Watt (4 x 4 W)	24 Watt (4 x 6 W)	36 Watt (6 x 6 W)	64 Watt (8 x 8 W)	80 Watt (10 x 8 W)
Total UV output wattage (no. of tubes x UVA watt/ tube)as measured after 1000 hrs of usage	1.8 W (2 x 0.9 W)	2 W (4 x 0.5 W)	3.6 W (4 x 0.9 W)	5.4 W (6 x 0.9 W)	11.2 W (8 x 1.4 W)	14.0 W (10 x 1.4 W)
Viewing window (w) x (l) cm	15 x 10	10 x 10	15 x 10	18 x 15	25x 20	25 x 25
UV output per cm ²	0.012 W/cm ²	0.020 W/cm ²	0.024 W/cm ²	0.020 W/cm ²	0.022 W/cm ²	0.022 W/cm ²
Dimensions of the base [measurement excludes pro- jecting knobs and switches]	(w) x (h) x (d) cm	(w) x (h) x (d) cm	(w) x (h) x (d) cm	(w) x (h) x (d) cm	(w) x (h) x (d) cm	(w) x (h) x (d) cm
Dimensions of the hood [measurement excludes pro- jecting parts]	(w) x (h) x (d) cm	(w) x (h) x (d) cm	(w) x (h) x (d) cm	(w) x (h) x (d) cm	(w) x (h) x (d) cm	(w) x (h) x (d) cm
ON/ OFF switch position	Front panel	Front panel	Front panel	Front panel	Front panel	Front panel
High-low intensity control switch	Front panel	Front panel	Front panel	Front panel	Front panel	Front panel
Fusing position (Fuse rating)	Internal (1.5 mA)	Internal (1.5 mA)	Internal (1.5 mA)	Internal (1.5 mA)	Internal (1.5 mA)	Internal (1.5 mA)
Voltage input	230V rms, 50 Hz	230V rms, 50 Hz	230V rms, 50 Hz	230V rms, 50 Hz	230V rms, 50 Hz	230V rms, 50 Hz
Cooling by venting at the bottom	Yes	Yes	Yes	Yes	Yes	Yes
Upgradable to cooling via fan	Yes	No	Yes	Yes	Yes	Yes
Operating temp. range	15-45 °C	15-45 °C	15-45 °C	15-45 °C	15-45 °C	15-45 °C
Humidity tolerance (non-condensing)	up to 85%	up to 85%	up to 85%	up to 85%	up to 85%	up to 85%

Using the Glowworm

1. Make sure the ON/ OFF switch on the front panel of the trans-illuminator is switched off
2. Connect the mains plug to a stable source of power outlet
(230V, 50Hz, single phase, with functional grounding)
3. Carefully place your gel on the window of the trans-illuminator, taking care not to break the gel or to scratch the surface of the window
(If using a UV transparent tray then place the tray on the window)
4. Shut the lid of the Glowworm
5. Switch ON the mains switch on the front panel – the UV tubes should start glowing immediately
6. You can toggle between the High and Low intensity using the push button switch.
(HIGH intensity – knob in “OUT” position/ LOW intensity – knob in “IN”)
 - The gel can be viewed through the dark hood fitted with the chroma-filter provided for excellent band visualization (Available as an additional accessory)
 - a. Ensure the mains switch on the front panel is OFF
 - b. Open the lid of the glowworm
 - c. Place the hood over the window
(The hood extends about 2-3 cm on all sides of the window)
 - d. Switch ON the mains switch on the front panel
 - e. View the gel through the chroma-filter provided on the top of the hood
 - If band excision has to be performed, then the trans-illuminator can be turned around such that the back panel is facing you and the front panel is away from you. Partially lifting the lid will allow the band excision
7. When visualization is complete, switch OFF the mains switch on the front panel
8. Open the lid (or if using the hood - remove the hood)
9. Carefully lift the gel from the window of the trans-illuminator, taking care not to scratch the surface of the window
10. Clean the window surface with a tissue paper dampened with distilled water. Wipe excess distilled water with a dry tissue paper
(DO NOT USE ANY OTHER CLEANING AGENTS. Alcohol, cleaning spirits etc. will damage the surface)
11. Close the lid or place the hood over the window

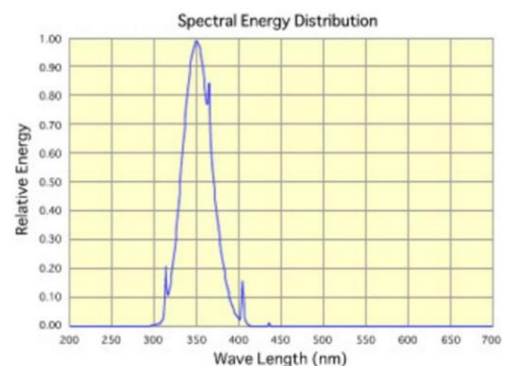
Working of the TechnoSource UV trans-illuminator



Spectral Energy Distribution of the UVA tubes used in Gloworm systems.

The tubes used in our Gloworm UV trans-illuminators have a very narrow output band. This ensures that:

- There is minimal DNA damage, as there is almost no output at wavelengths below 320 nm &
- Very low white light emissions as there is almost no output at wavelengths above 420 nm.



The principle of DNA intercalated Ethidium Bromide fluorescence:

1. Ethidium bromide (EtBr) is a powerful mutagen, toxic by inhalation, ingestion and skin contact. EtBr intercalates into the double helix, increasing the spacing of successive base pairs. *This distorts the regular phosphate backbone and reduces the pitch of the helix. EtBr binding causes an increase of up to 27% in length of DNA.*
2. The fixed position and its close proximity of the bound dye to the bases cause an increased fluorescent yield compared to the dye in free solution. *It is weakly fluorescent in aqueous solution.*
3. UV light is divided into three regions:

	UVA (Used in Glowworms)	UVB	UVC
Range	~320-420 nm	~280-380 nm	~240-270 nm
Peak emissions of std available tubes	366	302	254

The emissions spread 50-60 nm on either side of the peak. The tubes also emit some white light.

4. The advantages and disadvantages of the three illuminating sources are listed below.
 - a. UVA bulbs: Glowworm trans-illuminators use UVA tubes.

UVA is a normal component of sunlight (it is responsible for giving a skin tan). It is not mutagenic or harmful to eyes and skin. It does not dimerize thymidine nor break the DNA backbone. Hence, it does not cause photo bleaching.

[Photobleaching effect of different wavelengths can be represented as: $UVC \gg UVB > UVA$]

However, the UVA tubes emit large amount of violet-blue light, adversely affecting the contrast when viewing faint fluorescent bands. The use of the chroma-filter in the Glowworm counters this and provides clear visibility.

(Radiation at 302 nm and 366 nm is absorbed by the dye itself. In both cases a fraction of the energy is re-emitted at 590 nm in the red-orange region of the visible spectrum).
 - b. UVB bulbs:

UVB is absorbed by (carbon-carbon)C-C bonds. It results in C-C bond breakage of the DNA backbone and prevents resonance transfer of the energy to the intercalated EtBr (Photo bleaching).It causes retinal damage and sunburn. The bulbs emit a small fraction (~5%) of UVC light whose deleterious properties have been outlined in section 'c'. UVB bulbs also emit white light,hence for use in trans-illuminators need a special glass filter that is transparent to UV light and blocks blue and longer wavelengths. (*But these filters do transmit violet light*). These filters are expensive, get solarized with use and also adsorb spilled EtBr that results in auto fluorescence.
 - c. UVC bulbs:

These tubes are used for a germicidal action. UVC damages eyes and skin and is highly mutagenic. It causes DNA damage (nicks, photo-bleaching and dimerization). It is highly recommended that protective clothing and gear is worn to ensure safety. When a UVC bulb is used in a trans-illuminator UV-transparent gel trays cannot be used as the UVC does not travel through PMMA (which is the commonly used material for gel trays), hence either the gel has to be put directly on the filter or epi illumination has to be used. UVC bulbs also emit white light and a special glass filter needs to be used (As discussed in point 'b' above)

EtBr-DNA complexes yield best fluorescence at 254 nm but are subjected to photo-bleaching and DNA damage.

Trouble shooting procedure

SR. NO.	Indication	Cause	Remedy
1	Mains switch is not illuminated AND UV tubes are not glowing	Faulty main supply	Restore the mains supply
		Instrument fuse blown	Try replacing with correct fuse of 1.5A, only once. If fuse blows again contact us at sales@techresource.in
2	Mains switch is illuminated but UV tubes are not glowing	Electronic ballast is blown	Ballast needs to be replaced. (We use specially designed ballast. DO NOT attempt to replace with commercially available ballast)
		UV tubes are not functional	UV tubes need to be replaced (Please contact us to get the correct UVA tubes)
3	Mains switch is not illuminated but UV tubes are glowing	The bulb in the mains switch is blown.	Mains switch needs to be replaced (Please contact us at sales@techresource.in)
4	UVA tubes are ON but no bands seen in the gel	Sample has degraded	A ladder (or any control) would help to visualize if the gel has run properly.
		Inadequate amount of sample	Load a larger amount of sample.
		Tubes have crossed their functional life of 3000 hrs	Ask for replacement set of tubes (with 1 hr of usage per day*, the tubes should remain efficient for ~ 10 yrs)
		Sample has not run.	Check if fluorescence is present in the wells. If yes please follow the trouble shooting guide in any of our Horizontal electrophoresis manuals.
		Sample has run out of the gel	Compare your band position with respect to the dye front. Bromophenol blue runs at approximately 0.5Kb-0.4Kb in 0.5 – 1.5% gels (xylene cyanol at 10Kb-4Kb) and at ~ 0.1Kb in 2-3% gels (xylene cyanol at ~ 0.5Kb).
		Low amount of EtBr	Use a higher concentration of EtBr (ideal concentration for staining is 0.5ug/mL) Stain for a longer time in EtBr
5	High EtBr background	High background of EtBr observed	Remove the gel from the window and clean the excess EtBr using tissue paper made damp with D/W. (Do not

		on the filter	use any other cleaning agent) If problem persists contact us at sales@techresource.in
		High background of EtBr in the gel	De-staining of the agarose gel should be performed using a 0.1M MgCl ₂ in D/W or buffer. (de-staining in D/W or buffer will not reduce the background completely)

* Calculated with 5 working days in a week, with one hour of continuous usage at the high intensity setting, at operating temperature of 25°C. Repeated ON-OFF cycles will shorten the life span.

If you are facing any difficulty in understanding the instructions or operating the trans-illuminator, kindly contact us at: sales@techresource.in with your feedback on the steps given above. This will provide us with the necessary information to advise you properly.