VWRxB Series
Infrared Viewers

User Guide



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Chapter 1 Introduction

1.1 Intended Use

1.2 Explanation of Safety Warnings

⚠WARNING Warning indicates a hazard with a medium level of risk that, if not avoided, could result in death or serious injury.

⚠CAUTION Caution indicates a hazard with a low level of risk that, if not avoided, could result in minor or moderate injury.

 Danger, Warning, or Caution

 Laser Radiation Warning

 LED Radiation Warning

 Shock Warning

CE UKCA The CE/UKCA markings on the product are the manufacturer's declaration that the product complies with the essential requirements of the relevant European health, safety, and environmental protection legislation.

 The wheelie bin symbol on the product, the accessories or packaging indicates that this device must not be treated as unsorted municipal waste but must be collected separately.

1.3 Description

Infrared (IR) viewers (Item #s VWR1B, VWR2B, and VWR3B) are high-grade image converters designed to observe indirect radiation of infrared lasers, light emitting diodes (LED), and other IR sources in the 350 – 2000 nm region. The lightweight, compact device is designed to be used hand-held.

The IR viewers have excellent resolution of 60 LP/mm and IR sensitivity. These devices can view continuous and pulsed laser radiation, with the ability to visualize pulse duration from ps to µs without synchronization.

1.3.1 Applications

- Laser Alignment and Safety
- IR viewers are ideal for alignment of UV to IR laser beams and optical components in UV to IR systems.
- Viewer can safely visualize beams that are not visible through required laser safety glasses.
- Viewing Dirty and/or Damaged Optics *in Situ*
- Directly Visualizing Beam Size and Shape
- Identifying Break or Light Leakage in a Fiber System
- Aligning Laser Cavities
- Viewing Overlapping Spots in a Crystal

1.3.2 How Does it Work?

The IR viewers are based on a first-generation high-grade image converter that has an electro-static focusing system, photocathode S-1+ with increased concentration of oxygen and screen of type P-20 with the maximum of luminescence at 550 nm.

IR viewers focus emitted or reflected light from a chosen subject into an evacuated tube with a photocathode where a photoelectron image is generated by the incident radiation. The generated photoelectrons are accelerated by a 16 - 18 kV voltage when powered. These accelerated photoelectrons are directed toward the output phosphor screen. When they hit the phosphor, the incident photoelectrons cause it to glow. The photoelectrons generated by the photocathode and their subsequent acceleration by a strong electric field is known as an electrostatic lens. Photoelectrons generated in different locations by the incident radiation arrive at the phosphor screen in different locations as well, creating a visible image of the incident radiation. The fluorescent green light output (550 nm) from the excitation of the phosphor can be observed via an adjustable eyepiece lens and is independent of the wavelength of the incident radiation.

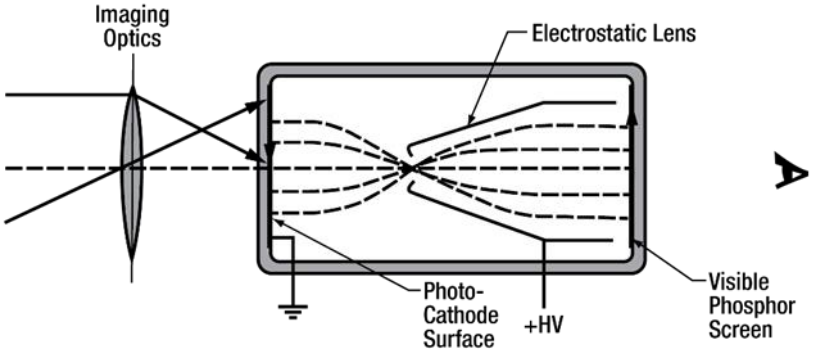


Figure 1 Diagram of the IR Viewer Phosphor Screen

1.4 Technical Data

1.4.1 Specifications

Item #	VWR1B	VWR2B	VWR3B
Spectral Sensitivity	350 - 1300 nm	350 - 1700 nm	350 – 2000 nm
Resolution	60 LP/mm		
Field of View	40°		
Magnification	1X		
Objective Lens	F1.4/25 mm		
Adjustable Iris	Included		
Focus	<0.1 m to Infinity		
Charging Port	5 V Micro-USB		
Non-Uniformity of Screen	<20%		
Non-Uniformity of Response	<15%		
Distortion of Image	<18%		
Battery Life (Continuous)	50 hours		
Weight	0.4 kg		
Dimensions	153.0 mm - 157.1 mm x 172.9 mm x 51.0 mm (6.02" - 6.18" x 6.81" x 2.01")		
Temperature Range	-10 °C to 40 °C		
Mounting Thread	1/4"-20 Internal Thread		

1.4.2 Graph

This data is for reference only and actual performance may vary.

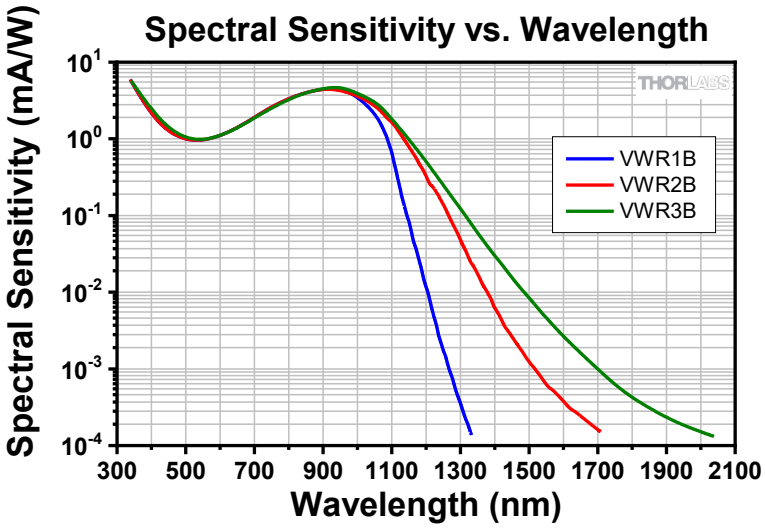


Figure 2 Spectral Sensitivity vs. Wavelength

1.5 Components



Figure 3 Identification of VWR IR Viewer

1.6 Simplified Declaration of Conformity

The full text of the EU declaration of conformity is available at the following internet address: **www.thorlabs.com/manuals**.

Chapter 2 Safety

WARNING

Risk of Electrical Shock
Electrical safety requirements must be followed while operating this device.

WARNING

Warning
The customer is responsible for light source safety while using viewer as a standalone device or integrated into a system.



Warning
The customer must consider protective measures if necessary.



Warning
This device will not protect you from direct or high light radiation. Use viewer with caution and appropriate attenuation.

Chapter 3 Installation

3.1 Packing List/Special Tools Required for Installation

Each of the VWRxB IR Viewers will come with the following parts:

- The VWR1B, VWR2B, or VWR3B IR Viewer
- One Cap for Removable Filter
- One USB 2.0 Type A to Micro B
- The Carrying Case

The IR viewers do not ship with a battery charger or adapter; for a compatible charger, we recommend the Item # DS5 Regulated Power Supply.

Chapter 4 Operation



Caution
Do not use the device for direct beam viewing. Long-term over-exposure may cause saturation of screen and decrease of resolution or irreversible reduction of photocathode response.



Warning
While operating the viewer, do not stare at the direct laser (or other source) light even with safety goggles.

4.1 Operation Instructions

1. To charge the device, use the micro-USB outlet on the side of the handle. The unit will come partially charged.
2. Take off the lens cover. To switch the unit on, press the on/off button. NOTE: After switching off, the device continues to work for some minutes due to the accumulated power.
3. The switch remains in the on position once the on/off button is pressed. The unit will power down on its own after several minutes.

4. Rotate the focus adjustment ring to focus the lens 1X (F1.4/25 mm lens). To adjust the iris via the iris adjustment ring and lock, release the screw, adjust the diaphragm and tighten the screw. Turn the adjustable focus eyepiece for eyepiece focus adjustment.
5. IR viewers come with a removable IR filter. While viewing reflected radiation, paper cards or metallic surfaces will work. TIP: For some wavelength regions, viewing through an IR viewer using an IR detector card as the surface under illumination can provide additional sensitivity (this works especially well near 1550 nm).

4.2 Additional Information

4.2.1 IR Viewer in Comparison with a CCD Camera

Certain models of CCD cameras can be used to observe near-infrared radiation at wavelengths up to 1100 nm. However, because these cameras are designed for optimum performance in the visible wavelength range, they exhibit mediocre performance in the near-infrared range; image bleeding, blooming, low sensitivity and low contrast are some of the observed characteristics. Image conversion viewers are designed to observe a much wider spectrum.

4.2.2 Visualization of Infrared Laser Beam

If dust particles are in the beam path, the beam will become partly visible. IR viewers can be used to see the projection of the beam spot on a flat diffusing surface such as a white card or metallic surface.

4.2.3 Black Spots on Screen

Black spots on the screen are cosmetic blemishes in the image converter that do not affect the performance or reliability of an infrared viewer. Some spots are inherent in the manufacturing processes. An example of a VWRxB IR Viewer with several black spots that are allowable is shown in Figure 4.

Zone	Form and Size of Zones	Greatest Size of Spots			Total Area of Allowable Defects on Screen (mm^2)
		Non-Accounted	Accounted		
			Typical	Max	
1	Circle Ø12 mm	Ø0.25 mm	Ø0.8 mm	3	1.5
2	Ring Ø12 - 19 mm	Ø0.5 mm	Ø1 mm	5	2
3	Ring Ø19 - 24 mm	Not Specified			

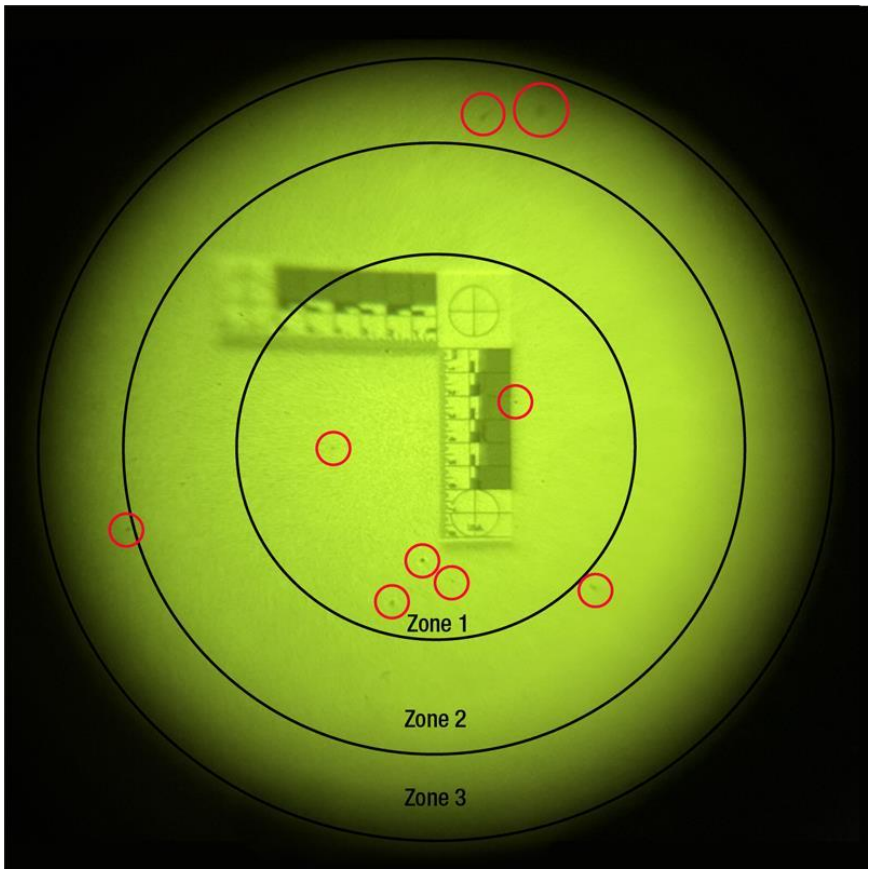


Figure 4 The image above shows some acceptable black spots (circled in red) as defined by the table above. The Zones referenced in the table are labeled on the image.

Chapter 5 Troubleshooting and Repair

The LED on the viewer will show different colors depending on the status of the viewer.

LED Color and State	Condition
Off	Power is Off
Solid Green	The viewer is in the process of turning on/off.
Slow Blinking Blue	Power on, unit ready
Fast Blinking Blue	Low Battery
Solid Red	The viewer is dead or is charging
Solid Purple	Power is on while charging

When charging, the LED will initially turn red when first plugged in. After a moment, the LED will turn back off. The LED turning off does not mean the viewer is no longer charging.

Chapter 6 Disposal

Thorlabs verifies our compliance with the WEEE (Waste Electrical and Electronic Equipment) directive of the European Community and the corresponding national laws. Accordingly, all end users in the EC may return “end

of life" Annex I category electrical and electronic equipment sold after August 13, 2005 to Thorlabs, without incurring disposal charges. Eligible units are marked with the crossed out "wheelie bin" logo (see right), were sold to and are currently owned by a company or institute within the EC and are not dissembled or contaminated. Contact Thorlabs for more information. Waste treatment is your own responsibility. "End of life" units must be returned to Thorlabs or handed to a company specializing in waste recovery. Do not dispose of the unit in a litter bin or at a public waste disposal site. It is the user's responsibility to delete all private data stored on the device prior to disposal.

6.1 Return of Devices

This precision device is only serviceable if returned and properly packed into the complete original packaging including the complete shipment plus the cardboard insert that holds the enclosed devices. If necessary, ask for replacement packaging. Refer servicing to qualified personnel.

Chapter 7 Thorlabs Worldwide Contacts

For technical support or sales inquiries, please visit us at www.thorlabs.com/contact for our most up-to-date contact information.



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