User Manual

INFRARED VIEWERS

IRV3 SERIES

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1 Warranty

Our IR Viewers are guaranteed for a period of 12 months after the date of shipment. There is no limit to the operational hours during this time. The only exception to this warranty is obvious misuse. Before returning your instrument for warranty or normal service, contact a customer service representative for a return authorization number as specified in Section 1.1.

We will provide you with a convenient shipping address at that time. In the case of non-warranty service, a quote will be provided for the cost of repair (after receipt and inspection) for your approval before any work is done.

1..1 Sales, Service and Technical Support Center

UNITED STATES
Newport Corporation
1791 Deere Avenue
Irvine, California, 92606 USA
Attention: Customer Service
Phone (949) 863-3144
www.newport.com/contact-us

Please visit: https://www.newport.com/contact/contactslocations for International Distributors and Representatives

2 Safety Information

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

The customer must consider protective measures if necessary.

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

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

Electrical safety requirements must be complied while operating this device.

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

Use your computer or phone charger with USB cable to charge the device. Do not charge the device with a charger which is more powerful than 5V DC 500mA.

3 About

High performance image conversion viewers VIR, based on high - grade image converter, are designed to observe indirect radiation of infrared laser, light-emitting diodes (LED), dye, and other IR sources in 350 - 2000 nm spectral region. The lightweight, compact device can be used hand-held, or post-mounted with the 1/4-20 internal thread.

VIR viewer has better resolution, infrared sensitivity, and factor of intensification. Also, it can be used with a CCD camera adapter for PC and video registration of the image.

This device allows viewing continuous laser radiation as well as pulsed laser radiation with pulse duration from ps to μs without synchronization.

4 How it works

The IR viewer design is 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 maximum of luminescence at 550nm. Infrared viewer focus emitted or reflected light from a chosen subject into the image tube where electron image is generated. When powered (with battery or power supply) the 16-18 kV voltage is generated required to accelerate the electron image into the output phosphor screen. The fluorescent green light output (550 nm) is observed via an adjustable eyepiece lens.

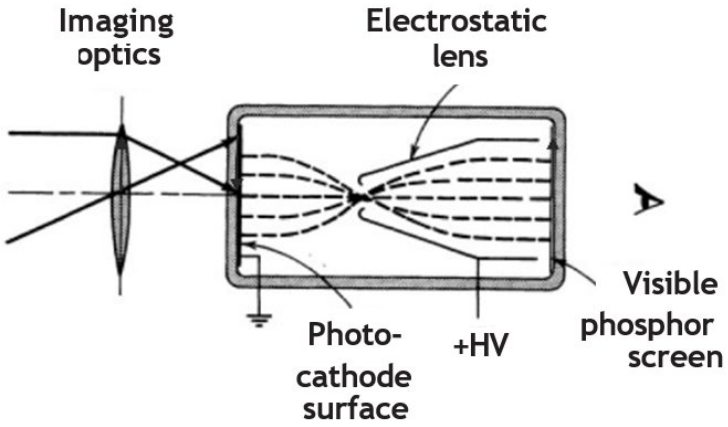

Figure 1: How it works

5 Applications

- **Laser alignment and safety – IR viewers are ideal for alignment of infrared laser beam and optical components in near infrared systems**
- **Semiconductors wafer inspection – With a microscope adapter IR viewer can be used to view through the surface of silicon and gallium arsenide wafers**
- **Forensics and art restoration**
- **Photo processing**
- **Thermal imaging**
- **Food sorting**
- **Vein and blood vessel observation under the skin**
- **Fluid inspection**

6 Operation

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

Use your computer or phone charger with USB cable to charge the device. Do not charge the device with a charger which is more powerful than 5V DC 500mA.

- **To charge the device use USB outlet at the bottom of the handle.**
- **Screw the handle (6) into the tripod thread ¼ inches (8) in body.**
- **Take of the lens cover. To switch the unit on, press button (2). NOTE: after switching off, the device continues to work some minutes due to the accumulated power.**
- **Rotate the ring (3) to focus the lens 1X (F1.4/25mm). Rotate ring (3) to focus the lens 2X (F1.8/50mm). For adjustment of diaphragm (9), release the screw, adjust the diaphragm (9) and tighten the screw. Turn the ring (5) for eyepiece focus adjustment.**
- **When viewing in the near-infrared range, use a cut-off filter (4). While viewing a reflected radiation, use a metallic surface as a reflector. Any paper surface absorbs the radiation greatly.**

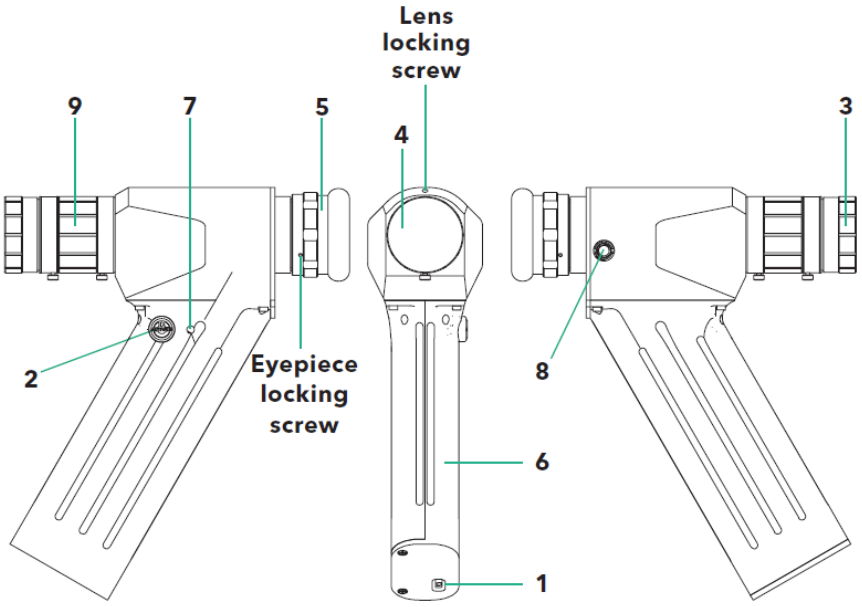

Figure 2: IRV3 1X Viewer

1. USB on a handle for charging
2. Button ON/OFF
3. Focus adjustment ring
4. IR Filter
5. Eyepiece
6. Handle
7. LED
8. Tripod thread
9. Iris adjustment ring

3. Focus adjustment ring

9. Iris adjustment ring

Figure 3: Lenses 1X (left) and 2X (right)

7 Visualization

7..1 Photosensitivity

The minimum detectable signal for a near-infrared viewer depends on:

- Power density
- Wavelength of incident radiation
- Effective aperture of the objective lens
- Distance between observed target and the viewer
- Time duration of the signal (pulsed or continuous)
- Reflectivity of the diffusing surface
- Sensitivity of human eye or device used in viewing the output of the IR viewer

Approximate minimum of power densities required for observing an infrared laser source from a distance of one meter:

20 µW/cm2 for a 1060 nm; 500 µW/cm2 for a 1300 nm. The IR viewer with sensitivity 350-2000 nm has the photocathode S-1+ type which contain the increased concentration of oxygen. It increases sensitivity of the photocathode. IR viewer can be used to view 2.0 µm laser beam at minimum power density 2 W/cm2. When operated in the 1500-2000 nm range, IR viewer has a low spectral response, therefore observations can be performed when the following requirements are met:

1. Use an IR cut-off filter or interference filter and darken the room to reduce the external background.
2. Use a metallic surface for observation of reflected radiation, as any other material might absorb infrared radiation.

7..2 Black Spots on Screen

Black spots on the screen are cosmetic blemishes in the image converter which do not affect the performance or reliability of infrared viewers. Some spots are inherent in the manufacturing processes.

7..3 Visualization of Beam in Mid-Air

It is a misconception that an IR viewer can be used to view infrared laser beams in “mid-air” (1100 – 2000 nm). However, if dust particles are in the beam path, the beam will become partly visible. Basically, IR viewers can be used to see the projection of the infrared beam spot on a flat diffusing surface such as a white card or metallic surface.

7..4 Spectral Sensitivity

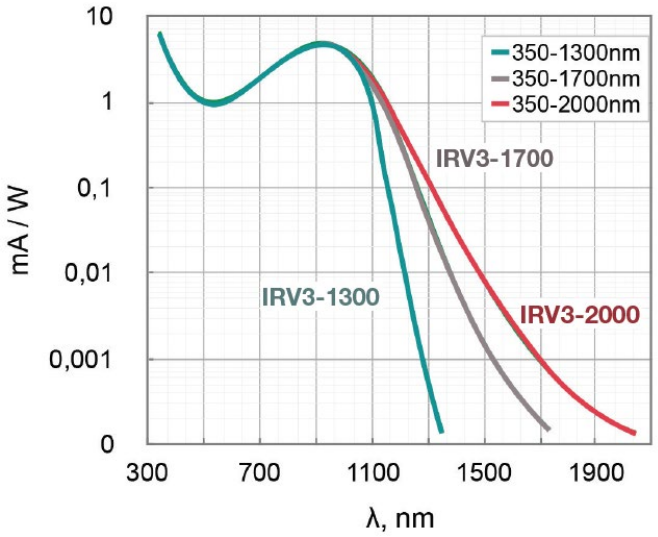

Figure 4: Spectral Sensitivity

7..5 Power Density

Approximate minimum of power densities required for observing an infrared laser source from a distance of one meter: 20 µW/cm2 for a 1060 nm; 500 µW/cm2 for a 1300 nm.

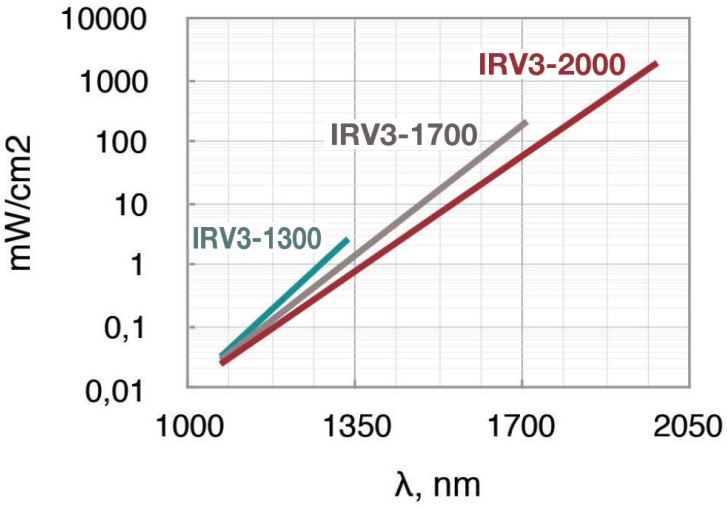

Figure 5: Power Density

7..6 Technical Parameters

Lens	1 (1X)	2 (2X)
Spectral sensitivity	(350-1300nm) IRV3-1300	
	(350-1700nm) IRV3-1700	
	(350-2000nm) IRV3-2000	
Resolution (center)	60 Lp/mm	60 Lp/mm
Field of view	40°	20°
Magnification	1X	2X
Objective lens	F1.4/26mm	F1.8/50mm
Adjustable iris	Included	Included
Focus	0.15m (0.05m)* to inf	0.5m (0.15m)* to inf
Working distance of lens	12.5 (+/0.2) mm	12.5 (+/0.2) mm
Non-uniformity of screen	<20%	
Non-uniformity of response	<15%	
Distortion of image	<50%	
Battery life (continuous)	50 hours	
Weight	0.42kg	
Dimensions	145x78x52 mm	
Temperature range	-10°C...40°C	
Tripod or handle connection	R”1/4”	
* with distance ring		

8 Maintenance Instructions

1. Keep away viewer from mechanical damage and moisture.

2. Protect the lenses from dirt. If necessary, clean them with clean, soft cloth, remove oiled spots or deposit with cotton wool slightly wetted in rectified alcohol or with an alcohol-ether mixture.

3. If necessary, unscrew the lens and clean the photocathode window because dust can be seen through the eyepiece.

4. If the viewer is not used, please keep the objective closed due to photo cathode exposure to light and possible degradation of IR-sensitive material.