

# INFRARED VIEWERS



MANUAL

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## INTRODUCTION

Infrared (IR) radiation is non-visible to human eye, therefore it is very hard to align infrared laser beam. **Laserand** offers IR viewer, which helps easily observe the IR radiation, align laser beam and calibrate laser system. Near IR viewers are extremely required in each laboratory, because users can locate stray beams reflections without eye damage or injuries. The IR series infrared viewers are designed to view a light of laser sources, which emit light in near infrared zone in 350-2000 nm spectral region. Viewers are used to observe indirect radiation of IR Light emitting diodes (LED's), diode, dye and other laser and laser sources. We offer low cost, compact battery operated IR viewers. This device allows viewing continuous lasers radiation as well as pulsed lasers radiation with pulse duration from ps to  $\mu$ s without synchro-nization.

## HOW IT WORKS

Infrared viewer focus emitted or reflected light from a chosen subject into the image tube. Electron image is generated in accordance to S-1 spectral sensitivity and incident intensity of the photocathode material. The device is powered by pressing and maintaining a push-button located on the device. When powered, and internal high voltage 3V battery – based power supply generates the 16-18 kV 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.

## 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 about 1100 nm. However, because these cameras are designed for optimum performance in the visible wavelength range, as a result, they exhibit mediocre performance in the near-infrared range; image bleeding, blooming, low sensitivity and low contrast are some of the observed characteristics.

## VISUALIZATION OF INFRARED LASER 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, as with the beam from a flashlight, if dust particles are in the beam path, the beam will become partly visible. Ordinarily, 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.

## POWER DENSITY

Approximately minimum power densities required to view an infrared laser beam from a distance one meter:

Model	Wavelength, nm	Power density, mW/cm <sup>2</sup>
6 - IR-1300V1,	1060	0,04
6 - IR-1300V2	1300	0,7
6 - IR-1700V1,	1300	0,5
6 - IR-1700V2	1500	50
	1700	150
	1500	10
6 - IR-2000V1,	1700	50
6 - IR-2000V2	1800	180
	2000	2000

## SPECTRAL SENSITIVITY

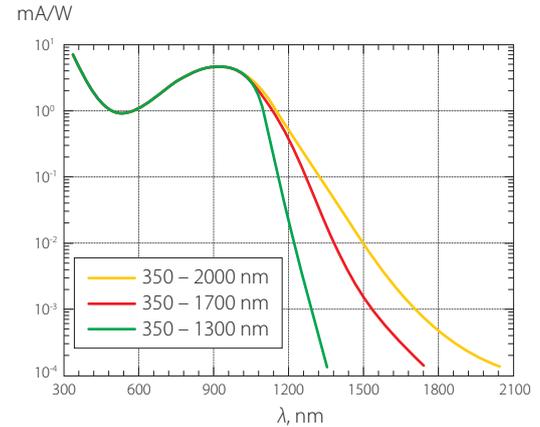


Figure 1. Typical spectral sensitivity for IR viewers.

## OPERATION

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

1. Unscrew a lid (1) of the battery compartment and install one AAA size battery into battery compartment, observing the polarity. Use AC/DC 110-220V/3V adapter (is not delivered) and a socket (2) for long operation.
2. Screw a handle (7) into the tripod thread  $\frac{1}{4}$  inches (8) of the IR viewer.
3. Unscrew a lid (9). To switch on the unit, press button (3).

**Note:** after switching off, the device continues to work some minutes due to the reserved energy.

4. By focusing objective (4) and eyepiece (5) in turn, try to achieve a bright image of the object under observation.
5. When observations are made in the near infrared region, use cut-off filter (6) with transmission from 700 nm and further. When visualizing is reflected radiation, use a metallic surface for a reflective one, as any paper will absorb heavily.

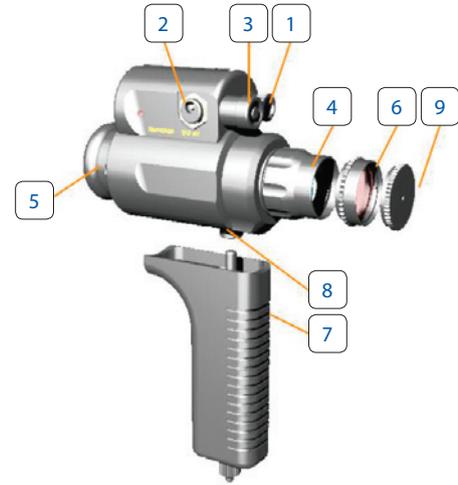


Figure 2. IR viewer scheme.

## MAINTENANCE INSTRUCTION

1. During the IR viewer operation there is no danger of electric shock.
2. When brought into a warm room from the cold outside the optical elements may become wet.
3. Prevent the viewer from mechanical damage and moisture.
4. 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 alcohol-ether mixture.
5. If necessary, unscrew the lens and clean the photocathode, because the dust can be viewed through hole of cover of the lens.

## BLACK SPOTS ON THE SCREEN

Black spots on the screen are cosmetic blemishes in the image converter which do not affect the performance or reliability of an infrared viewers and some number of varying size are inherent in the manufacturing processes.

## TECHNICAL PARAMETERS

Model	6-IR1300V1	6-IR1700V1	6-IR200V1
Spectral sensitivity	350-1300 nm	350 - 1700 nm	350-2000 nm
Resolution (center)	60 lp/mm		
Field of view	40 degrees		
Magnification	1X		
Objective lens:	F1.4/26 mm without iris		
Focus	0.15 m to inf.		
Battery	1.5 V «AAA» type		
Battery life (continuous)	35 hours		
Input voltage from external power supply	DC 3 V, 20 mA max.		
Weight	0.38 kg		
Dimensions	155x78x55 mm		
Temperature range	-10°C...+40 °C		

Model	6-IR1300V2	6-IR1700V2	6-IR200V2
Spectral sensitivity	350-1300 nm	350 - 1700 nm	350-2000 nm
Resolution (center)	60 lp/mm		
Field of view	20 degrees		
Magnification	2X		
Objective lens:	F2/50 mm with iris		
Focus	0.15 m to inf.		
Battery	1.5 V «AAA» type		
Battery life (continuous)	35 hours		
Input voltage from external power supply	DC 3 V, 20 mA max.		
Weight	0.42 kg		
Dimensions	220x78x55 mm		
Temperature range	-10°C...+40 °C		

Lenses 1X (F1.4/26mm) and 2X (F2/50mm) are exchangeable.

**Standard kit for version 1 includes:** IR viewer, lens 1X, IR filter, handle, battery and case.

**Standard kit for version 2 includes:** IR viewer, lens 2X, distance ring, IR filter, handle, battery and case.

#### Accessories available upon request:

- Face mask for hands free operation;
- Infrared illuminator (800 nm wavelength);
- Neutral density filters (2-5% at 1.064 nm laser wavelength);
- Camera adapter;
- Microscope adapter;
- Iris diaphragm;
- C-mount adapter ring;
- Video adapter VA-1;
- Distance ring to 1X lens.

## PHOTOSENSITIVITY

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

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

Approximately minimum power densities required for viewing an infrared laser beam from a distance one meter:

- 20  $\mu\text{W}/\text{cm}^2$  for a 1060 nm
- 500  $\mu\text{W}/\text{cm}^2$  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 and shifts it in infrared area. The IR viewer can be used to view 2.0  $\mu\text{m}$  laser beam at minimum power density 2  $\text{W}/\text{cm}^2$ . When operated in the 1500-2000 nm range, the IR viewer has a low spectral response, therefore observations can be performed when the following requirements are met:

- Use an IR cut-off filter or interference filter and darken the room to reduce the external background;
- Use a metallic surface for viewing the laser infrared reflective radiation, as any paper for these purposes will absorb infrared radiation.

## WARRANTY

The manufacturer warrants its products against defects in materials and workmanship for a period of twelve months from the original date of Invoice. Any device returned for warranty service must be judged by the manufacturer as having been used according to its original design intents. As such, misuse, neglect, or any abnormal use is not covered by this warranty.

The manufacturer will repair or replace such products or parts thereof, which, upon inspection by the manufacturer, is found to be defective in either materials or workmanship. As a condition of the manufacturer's obligation regarding warranty work, the product must be returned to the manufacturer with a satisfactory proof of purchase.

This warranty is null and void if equipment has been altered, tampered with, modified, or otherwise abused, mishandled, or subjected to unauthorized repairs.

The manufacturer disclaims any other warranties, either expressed or implied, except as expressed herein. The sole obligations of the manufacturer are repair or replace the covered device.

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