Operating Instructions: Infrared Viewers (IRV3 & IRX3)

Introduction:
Power Technology's IR viewers convert otherwise invisible infrared radiation into a visible green image. These devices support both CW and pulsed sources down to picosecond–microsecond regimes without external synchronization.

Applications (typical): IR laser alignment; semiconductor wafer inspection (with microscope adapter); photo processing; thermal/industrial inspection; forensics; food sorting; fluid inspection; and biological illumination tasks.

Installation:

- **Mounting (both models):** Use the ¼-20 tripod interface for hands-free operation.
- **Lens/Eyepiece:** Install the supplied C-mount objective, then set coarse focus on the objective and fine focus at the eyepiece. (Locking screws as shown in figures.)
- **Filters (NIR use):** Fit the IR cut-off/attenuation filter for near-IR viewing; when inspecting reflections, prefer a metallic diffuser. Paper tends to absorb/attenuate IR.

Operation:

- **IRV3:** Charge via **USB-C** at **≤ 5 VDC / 500 mA**. (Do not exceed this rating.) An internal Li-ion pack powers the tube; after switching OFF, residual charge may keep the screen lit briefly—this is expected.

- **IRX3:** Install **two 3.6 V 18650 Li-ion** cells with correct polarity, close the cover securely, then power via the **ACTIVATE** button. Observe the LED battery indicator: solid = full, slow-flash = OK, fast-flash = low.

Caution – Direct exposure: Avoid exposing the tube face to concentrated radiation; permanent sensor damage can occur. **Important – These viewers are for indirect beam observation.** Do not use for direct beam viewing or to look for "mid-air" beams. View a diffuse target (IR card, matte metal, etc.)—over-exposure can damage the tube or reduce photocathode response.

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Operating Procedure & Control Description:

IRX3 (Figure 1)

1. **Power:** Insert two 18650 cells, close the cover, press **ACTIVATE**.

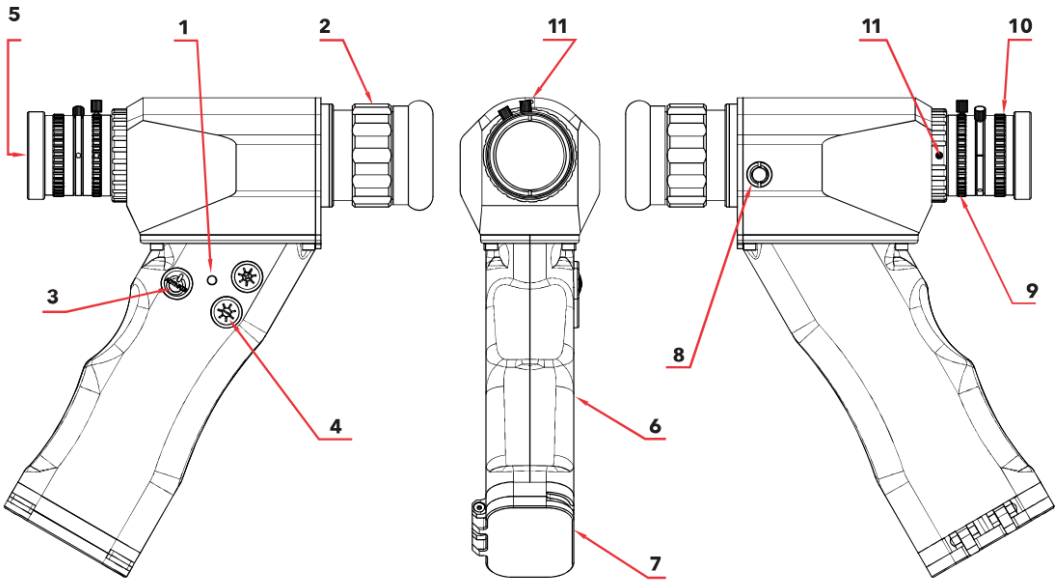
2. **Brightness:** Use **screen brightness buttons** to set comfortable luminance without blooming.

3. **Focusing & Iris:** Rotate the **focus ring** to sharpness; adjust the **diaphragm (iris)** for contrast and depth; set **eyepiece focus** to your vision.

4. **Filters & Targets:** Use the **cut-off filter** for NIR; prefer **metallic** diffuse targets over paper.

5. **Battery Status: LED solid** = full; **gradual flash** = acceptable; **rapid flash** = low. Auto power-off after inactivity (see data sheet).

Figure 1: IRX3



1. LED
2. Eyepiece focus ring
3. Button ACTIVATE
4. Screen brightness adjustment buttons
5. Filter
6. Handle
7. Battery cover
8. Tripod thread
9. Diaphragm adjustment ring
10. Focus adjustment ring
11. Lens locking screw

IRV3 (Figure 2)

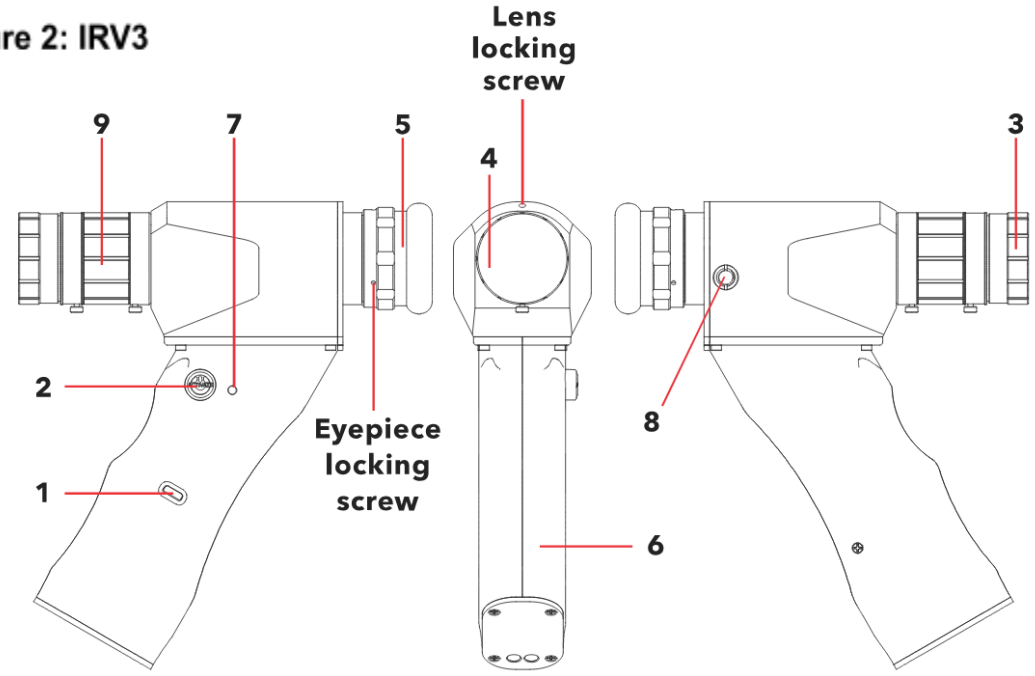
Power/Charge: If needed, connect USB-C (≤ 5 V/500 mA). Press the ON/OFF button to start. Residual screen glow after power-down is normal.

1. Focusing & Iris:
    - Rotate the objective focus ring to bring the scene to focus (1×: F/1.4 25 mm; 2×: F/1.8 50 mm).
    - Adjust the iris to balance brightness vs. depth of field; tighten the iris set screw after adjustment.
    - Fine-tune the eyepiece focus to your vision.

2. Filters & Targets: For NIR, install the IR cut-off filter. View a diffuse reflector (e.g., IR card or matte metal).
3. Tripod Use: Thread onto ¼-20 tripod for stable, hands-free operation.

Notes on Visualization: For wavelengths across the IRV model family (IRV1300/1700/2000), detection thresholds vary with wavelength and optical configuration; observing a diffuse target at 1 m typically requires the minimum irradiances indicated in the technical curves.

Figure 2: IRV3



1. USB-C 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

Troubleshooting (Both Models)

- Image too dim: Open iris moderately; verify correct filter; increase target reflectivity (matte aluminum card); ensure battery charge (IRX3 LED status).
- Blooming/saturation: Stop down the iris; add neutral density attenuation for very bright sources (IRX3 accessory ND filters).
- Cannot see free-space beam: Use a card/metallic target; do not attempt to “look into” the beam path.

Maintenance & Service:

These products contain no user-serviceable parts. Keep optics clean and dry. Use clean compressed air first; if needed, clean glass carefully with alcohol (isopropyl) on a lint-free swab. Avoid solvents on plastics or painted surfaces.

- Handling: Protect from mechanical shock and moisture ingress.
- Battery safety (IRX3): Follow local regulations; keep out of reach of children; never expose cells to heat/flame.

Warranty and Repair Return Policy:

No return will be accepted without a factory-issued RMA number clearly marked on the package. Collect/COD returns are not accepted. For warranty returns, PTI covers outbound shipment to the customer after repair. When requesting an RMA, provide a model, serial number(s), and a concise problem description.

> Opening or modifying the viewer outside documented procedures may void warranty and can require re-certification under 21 CFR 1040.10/.11.

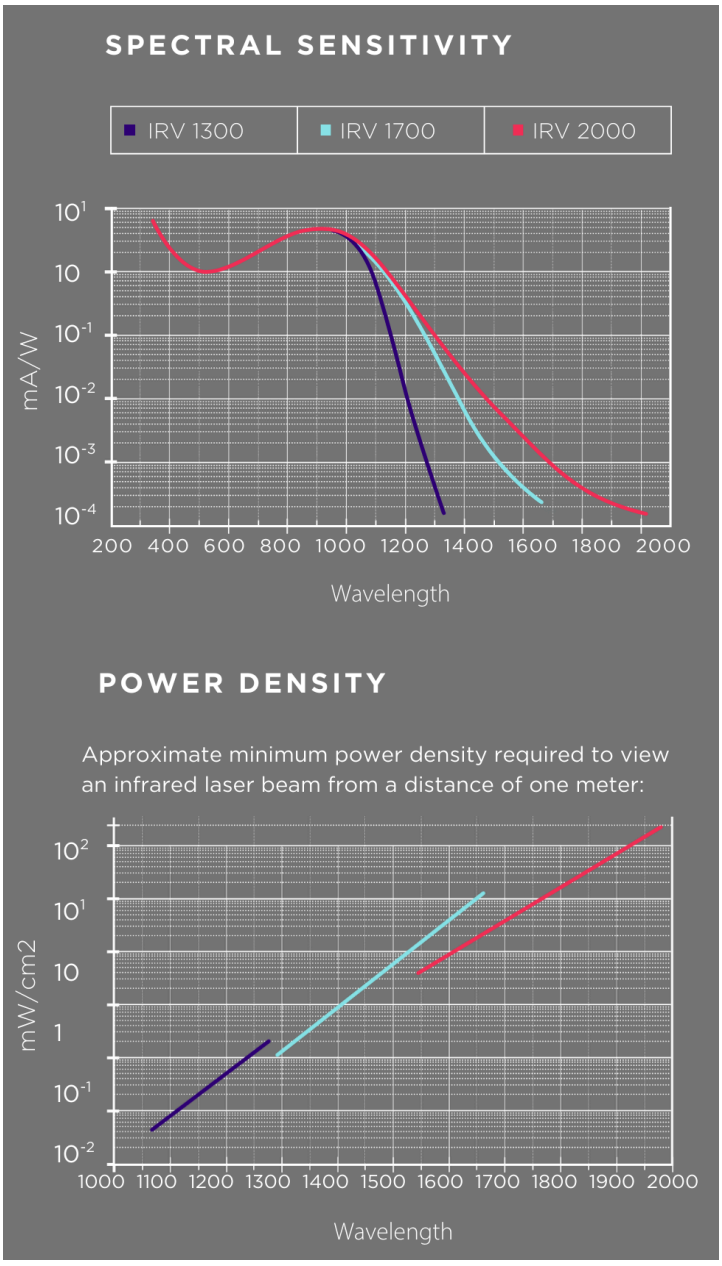
Laser Safety (Read Before Use):

- Use controls and procedures only as specified to avoid hazardous radiation exposure.
- Optical instruments increase eye hazard; never aim sources toward people; avoid eye-level beam paths.
- Always wear appropriate, wavelength-rated protective eyewear for the source under test.

Notes on Performance & Best Practices:

- Target choice dominates visibility: Use matte aluminum/ceramic IR viewing cards or rough metal, not paper, to maximize SNR.
- Keep irradiance within the tube's comfort zone: If the scene blooms, stop down the iris and/or add ND attenuation (IRX3 accessories include ND filters).
- Free-space beams: Don't rely on scattering; use projection at 1 m and consult the model's minimum power-density vs. wavelength curves for realistic expectations.

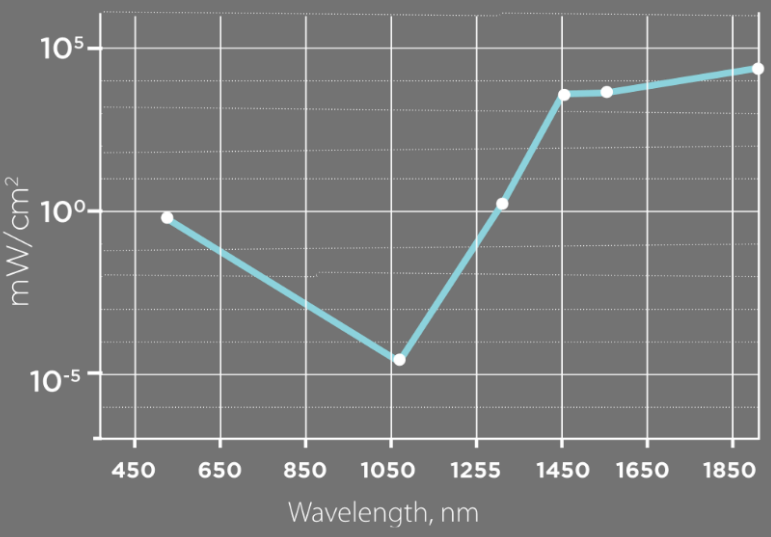
IRV3 Performance Charts: Spectral Sensitivity & Minimum Power Density



IRX3 Performance Charts: Minimum Power Density & Brightness Levels

Minimal Power density

Threshold power density dependance on wavelength. The threshold power density is defined by measuring a laser beam spot on a paper, which exhibits 20% of the overall brightness (calculated as 255 × 20% = 51), in contrast to the background. The measurements were taken with the viewer positioned 1.15 meters away from the piece of paper.



Brightness levels

Normalised brightness dependence on power difference from the minimum value. The power level of 0 signifies the theoretical minimal value at which the laser beam spot becomes observable on a piece of paper. It's worth noting that the viewer exhibits lower sensitivity to laser light at 1450nm compared to 1550nm or even 1900nm.