



## Operation Manual



# **NVS 14 Series**

## **NIGHT VISION MONOCULAR**

NVS 14-3XT, NVS 14-3GCS, NVS 14-3AG, NVS 14-3AGBW

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# IMPORTANT INFORMATION

**Read prior to activation.**

**You have purchased a sophisticated electronic device. To operate it properly, please read this manual carefully.**

**Ignoring the operation procedures described in this manual will void your warranty.**

- **NEVER** disassemble the Unit. This device contains a source of high voltage, which may be hazardous to your health.
- **NEVER** open the objective lens of an active Unit in bright light, including daylight. In the daytime the objective lens must be covered by the lens cap provided. The tiny hole in the cap provides enough light for daytime testing.
- **NEVER** aim an active Unit at intense light sources, such as lights, headlamps, campfires, the moon, etc.
- **NEVER** reverse the polarity of a battery.
- **NEVER** connect the Unit to any external power supplies.
- **ALWAYS** remove battery when not in use for extended period.
- **ALWAYS** keep the objective lenses covered when not in use.
- **ALWAYS** store the device in a warm dry place.

## Precautions

All NVS 14 series devices are sophisticated electro-optical instruments. They should be handled with due care:

- Each Unit contains fragile components. Avoid hard impacts, dust, moisture and abrupt changes of temperature.
- Do not touch the optical surfaces other than for cleaning with an appropriate lens cleaning kit. Doing so may damage the anti-reflective coating.
- Clean optical surfaces with professional lens cleaning supplies.
- Use only a soft clean cloth to clean the exterior of the device.
- Keep the device away from sources of heat, such as heating appliances, sunlight or central heating.
- Switch off the Unit and remove the battery during extended periods of non-operation.
- Do not apply excessive force or pressure to the lens assembly, movable parts or threaded connections.
- Small dark and/or light spots may be seen in the field of view due to considerable optical magnification of the eyepiece. This does not affect the operational capabilities of the device.

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# 1. OVERVIEW

Your NVS 14 series device (the “Unit”) is an optoelectronic monocular, intended for observation of objects and orientation at night or under dark conditions. The Unit is equipped with a Generation 3 (“Gen 3”) image intensifier tube (“IIT”), which amplifies low light, such as moonlight, starlight or man-made light. The Unit is waterproof to the depth of 1 meter for 30 minutes (with the exception of NVS 14-3GCS which is waterproof to 20 meters for 30 minutes).

3x, 4x and 8x add-on lenses can be attached to the Unit to increase system magnification for use as a longer range observation sight.

Utilizing the optional mechanical bridge, two Units can be combined to form night vision binoculars.

In its 1x configuration, the Unit can be mounted on a combat helmet or head harness.

**Some typical activities where NVS 14 series devices can be useful:**

- Law enforcement
- Wildlife observation
- Security
- Search and rescue
- Hunting (where permitted by law)

## Features

- Flip-up mechanism provides for unobstructed vision when the Unit is mounted on headgear or helmet;
- Built-in infrared illuminator enables observation in total darkness (i.e. basement, cave or dark room);
- Optional NVS H Mount (helmet mount) allows for effective combat operations;
- Optional weapon mount converts Unit to a night vision weapon sight that can be used alone or in conjunction with other daytime weapon sights;
- Soft rubber eyecup makes viewing comfortable;
- Utilizing the NVS Camera/Video Adaptor, the Unit can be connected to photo or video camera for surveillance operations.

Please read all the instructions carefully prior to using the Unit. Manufacturer reserves the right to introduce minor design changes without notice.

## NVS 14 Series Models

Model	Brief Description
NVS 14-3XT	Military specification night vision monocular with 1x magnification, Gen 3 IIT, helmet/head/weapon mountable, green image, 1meter waterproof.
NVS 13-3GCS	Military specification night vision monocular with 1x magnification, Gen 3 IIT, helmet/head/weapon mountable, green image, <b>20 meter waterproof.</b>
NVS 14-3AG	Military specification night vision monocular with 1x magnification, Gen 3 IIT, <b>auto-gated power supply</b> helmet/head/weapon mountable, green image, 1 meter waterproof.
NVS 14-3AGBW	Military specification night vision monocular with 1x magnification, Gen 3 IIT, <b>auto-gated power supply</b> helmet/head/weapon mountable, <b>black and white image</b> , 1 meter waterproof.



## 2. STANDARD DELIVERY SET

	<i>QUANTITY</i>
NVS 14 Series Unit	1
Head Harness	1
NVS Arm Mount	1
Objective Lens Cap	1
Operation Manual	1
Lens Cleaning Kit	1
AA battery	1

### 2.1 Optional accessories

US-style clip mount

Demist shield

Sacrificial window

3x add-on lens

5x add-on lens

Weapon mount

NVS Bridge

Hard case

Lens brush

Camera / video adapter

NVS H Mount

NVS Coupler

*Exact Delivery Set is subject to specific contract terms.*

### 3. SPECIFICATIONS

Model	3XT	3GCS	3AG	3AGBW
IIT Generation	Gen 3			
Photocathode Material	Gallium Arsenide (GaAs)			
Image Colour	Green			Black & White
Photocathode Diameter	17.5mm			
Minimum Photocathode Sensitivity	1800 $\mu\text{A}/\text{lm}^1$ 190 $\text{mA}/\text{W}^2$			
Luminous Gain	40,000 – 70,000 $\text{fL}/\text{fc}^3$ 10,000 – 20,000 $\text{fL}/\text{fc}^4$			
Auto-gating	X		✓	✓
Minimum Resolution <sup>5</sup>	64 lp/mm			
Minimum Signal to Noise <sup>6</sup>	24			
Bright Source Protection	✓			
Automatic Brightness Control	✓			
Auto-gating	X		✓	
Manual Gain Control	✓			
Manual Gain Adjustment Range	20 – 100%			
Magnification	1x			
Field of view (1x)	40°			
Focus range	0.25m to infinity			
Exit pupil diameter	20mm			
Eye relief	25mm			
Dioptric correction	$\pm 5$			

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<sup>1</sup> @2856°K

<sup>2</sup> @830nm

<sup>3</sup> @ $2 \times 10^{-6}$  fc

<sup>4</sup> @ $2 \times 10^{-4}$  fc

<sup>5,6</sup> Higher minimum available as per contract

Power supply	1x 3V CR-123 Lithium battery <b>OR</b> 1x 1.5 V AA Alkaline or lithium battery			
Maximum Current Consumption	25 mA			
Voltage	2.8±0.8			
Battery life	20 hours with I/R 40 hours without I/R			
Dimensions	118x48x69mm			
Weight	300g			
Operating Temperature Range	-50 to +55 °C			
MTBF	10,000 hours			
Modulation Transfer Function	@2.5 lp/mm	92%		
	@7.5 lp/mm	80%		
	@15.0 lp/mm	61%		
	@25.0 lp/mm	38%		
Black Spots Allowed per Zone	Spot Size (inches)	Zone 1	Zone 2	Zone 3
	0.012 ~ 0.015	0	0	0
	0.009 ~ 0.012	0	0	0
	0.006 ~ 0.009	0	1	1
	0.003 ~ 0.006	0	2	2

*As the design of NVS 14 series devices is being continuously improved, delivered specifications may be superior to those above. Where a discrepancy exists between the specifications above and the specifications in your contract/purchase order, the contract/purchase order takes precedence.*

## 4. UNIT DESIGN



**FIGURE 1**

1. On/Off/IR/Auto switch
2. Objective lens cap
3. Objective lens
4. Eyepiece with eyecup
5. Housing
6. Battery compartment cover and battery selection bushing
7. Battery compartment
8. Dovetail platform
9. Manual gain adjustment knob

## 5. OPERATION INSTRUCTIONS

### Installing battery

Unit is supplied without a battery installed.

**Prior to installing the battery, make sure the On/Off/IR/Auto switch (1, Fig.1) is in the OFF position and the objective lens cap is on.**

The Unit can operate on either a single AA or CR-123 lithium battery. Lithium batteries hold a charge longer than conventional batteries and provide better performance at low temperatures.

To install a battery remove the battery compartment cover (6, Fig.1) by rotating it counter clockwise. When using a CR-123 lithium battery, remove the battery bushing located under the battery compartment cover by rotating it counter clockwise.

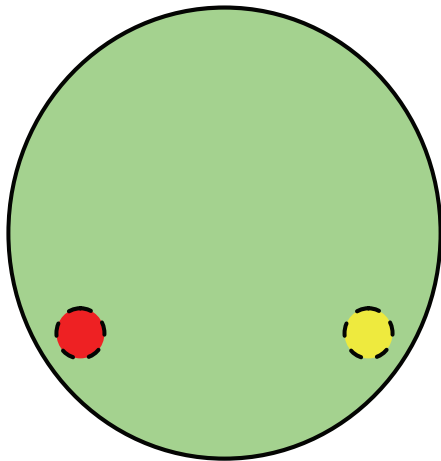
Store the bushing in a safe place while not in use. Make sure the battery is installed with the correct polarity as indicated on the housing. Insert the battery and replace the battery cover.

### Activating the Unit

**In daylight ensure the objective lens cap is in place prior to activating the Unit.**

To check if the Unit is operational switch it ON by rotating the On/Off/IR/Auto switch clockwise while looking through the eyepiece (4, Fig.1). You should see either a green or black and white image (depending on the model you have purchased). If

the screen is not lit ***ensure the batteries installed are charged and the polarity is correct.***



**FIGURE 2**

IR illuminator indicator (red, left), Low battery indicator (yellow, right)

When the Unit is ON you may see a red and/or yellow LED indicator in the field of view (Fig. 2). When the yellow or red LED indicators are flashing, the remaining battery power is low and it should be changed. For uninterrupted operation keep a fresh battery ready and replace it on time. If the red LED indicator is lit solidly, the IR illuminator is activated. This warning is intended to prevent the user from unintentionally giving

away their position.

In the daytime with the objective lens cap on, it is normal to observe a ‘fuzzy’ image. Switching on the Unit in the daytime is intended for testing purposes only. During night use, the objective lens cap should be removed and the ‘fuzzy’ image should no longer be observed.

The rotating switch has four positions: “Off”, “Auto”, “On”, “IR”. In Auto mode the monocular will switch off automatically when turned upright. This mode saves battery life and avoids unintentionally illuminating the users face during combat operations.

## **Switching the Unit off**

After you have finished using the Unit, turn it off by rotating the On/Off/IR/Auto switch to the 'OFF' position. Replace the objective lens cap. If storing the unit for an extended period, remove batteries. Place Unit in appropriate storage container.

## **Adjusting to individual vision**

Turn on the Unit. Direct the Unit at an object placed within 8-15 m from the viewer. While looking through the Unit at the object, first rotate the diopter adjustment ring on the eyepiece (4, Fig. 1). Once focus is nearly achieved, rotate the objective lens (3, Fig. 1) to achieve final focus.

### **5.1 Manual gain adjustment**

Each NVS 14 series device is equipped with a manual gain adjustment system (9, Fig. 1). This system allows the user to adjust the gain (or light amplification) of the Unit in accordance with the prevailing light conditions.

The manual gain system allows for the gain of the Unit to be set between 20% and 100%. In relatively dark situations, the gain should be set high enough that the user can see a clear, well-lit image in the eyepiece. In relatively bright conditions, the gain should be reduced to avoid an overly brightened image from being displayed in the eyepiece.

## **Auto shut OFF at bright light**

Each unit has a built-in high light sensor located near the IR illuminator (2, Fig. 1). This sensor shuts the monocular off after about 45 seconds of exposure to light exceeding  $10^{-1}$  lux.

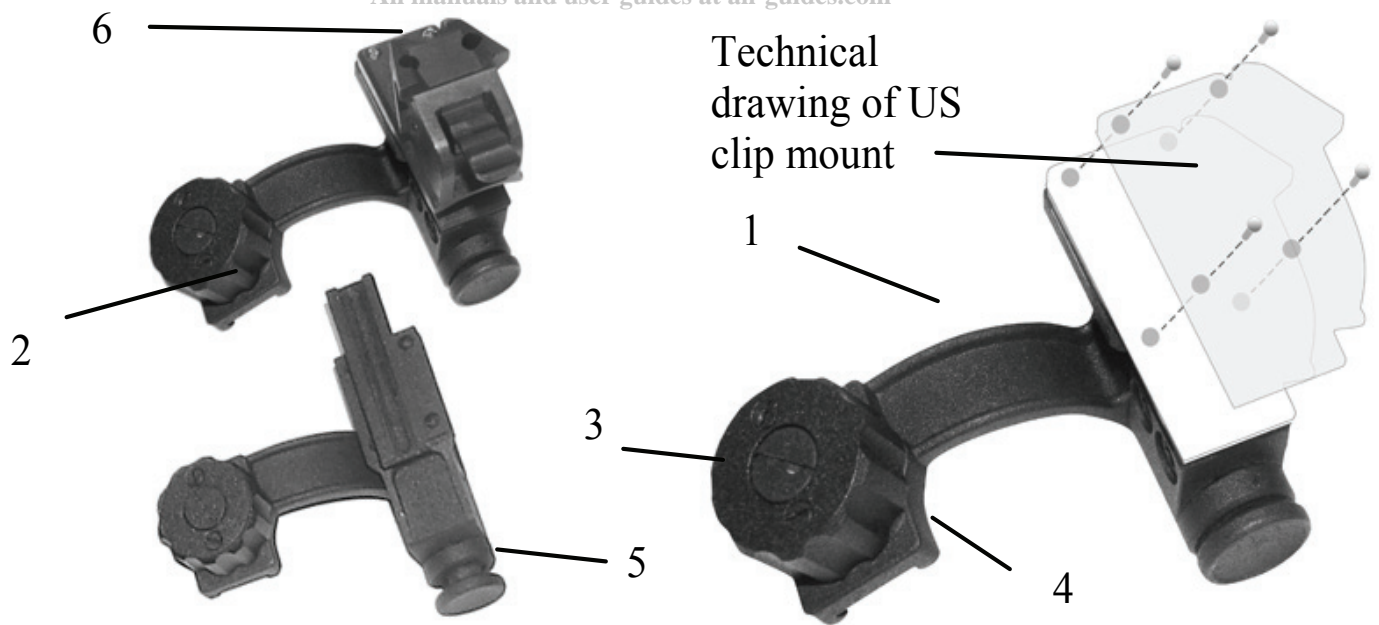
To reset the monocular switch it off and then back on as described in 6.3 and 6.2.

High-light shut-off feature does not mean that the Unit will react to occasional flashes or bright spots. It protects the tube against excessive light exposure only in order to avoid permanent damage.

## **Auto-gating system**

The NVS 14-3AG and NVS 14-3AGBW variants contain, in addition to the systems described above, an auto-gated power supply. This system automatically controls the power supplied to the IIT in changing lighting conditions. This serves not only to protect the IIT from exposure to bright lighting sources, but also to automatically provide the user with the optimal image regardless of prevailing light condition.





**FIGURE 3**

- |    |                   |    |               |
|----|-------------------|----|---------------|
| 1. | “Swing arm” mount | 4. | Unit groove   |
| 2. | Grooved pad       | 5. | Flip button   |
| 3. | Locking knob      | 6. | US clip mount |

### **Using the Unit with headgear or helmet**

The Unit is supplied with headgear designed to allow the mounting of the Unit on the head. Prior to using the headgear adjust its straps so that the headgear fits the head comfortably but firmly and does not slide off during movement.

The Unit is attached to the headgear with a swing arm mount (1, Fig. 3). To attach the arm mount to the headgear loosen the tightening screw on headgear, slide helmet groove (2, Fig. 3) onto the rail, and then tighten the screw.

To attach monocular to the arm turn the knob (3, Fig. 3), slide the arm groove (4, Fig.3) along the dovetail platform of the monocular (8, Fig. 1), and then release the knob.

To set comfortable eye-relief (the distance between your eye and the eyepiece), loosen tightening screw on the headgear and move the Unit, then tighten the locking screw.

To use the Unit with PASGT head and helmet mount unscrew the grooved pad (2, Fig. 3) from the swing arm mount and screw on the US type clip (6, Fig. 3) using four screws (Fig. 3) instead. US type helmet clip is optional and must be ordered separately.

To switch between left and right eye, press the flip button (5, Fig. 3) on the mount and rotate it respectively until you hear an audible click.

### **Swinging head mounted Unit for unobstructed view**

When the head mounted Unit is not in use you can raise it to clear the view without taking the headgear off by using the “flip/flop” feature. To swing the Unit from the view press the button (5, Fig. 3) and raise the device until you hear a click. In “Auto” position of the switch, the monocular will turn off automatically. Reverse the operation to return the Unit to working position.

### **Using IR illuminator**

In case of insufficient light when observing a close object turn on the IR illuminator by turning the On/Off/IR/Auto switch.

Red indicator visible through the eyepiece will warn you when the IR illuminator is on.

***Note: The IR illuminator is visible to anybody equipped with a night vision device and can disclose the user's presence.***

## 5.2 Installation of add-on lenses.

**Always ensure that the Unit is switched off when adding or removing an objective lens.**

To attach the afocal 3x add-on lens to the Unit, turn off the monocular. Remove the objective lens cap. Press the 3x lens firmly towards the eyepiece. Do not apply excessive pressure. Make sure that the lens is fixed well on the monocular. To return the monocular back to 1x magnification, pull off the lens.



**FIGURE 4**

NVS 14 with afocal 3x lens

To attach the 5x or 8x add-on lenses, follow the following procedure:

1. Make sure the Unit is off.
2. Remove the objective lens cap.

3. To detach the current lens: hold the lens by its base and rotate it counter-clockwise. Once the lens has been removed, store it in a safe, clean space.
4. To attach desired lens: rotate it clockwise along the threading until snug—do not overtighten.

The threads are very fine (to prevent humidity penetration) and can be damaged easily. Do not apply force when rotating the lens. If the desired lens does not rotate smoothly along the threading, make sure that the threads are aligned.

The Unit is ready for operation immediately after the lens change. During operation in brightly lit spaces, ensure the objective lens cap is in place.

### **Demist shield and sacrificial window**

***Note: Demist Shield and Sacrificial Window are optional.***

The sacrificial window protects the objective lens from sand, dust and other objects that can scratch or otherwise damage the lens. The sacrificial window is affixed on the objective lens in place of the tinted objective lens cap which comes installed on the Unit.

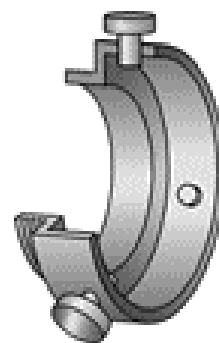
The demist shield filter protects the eyepiece against fogging. To install it fold the eyecup down, in order to access the thread, and screw the filter gently onto the eyepiece.

## Using the camera / video adapter

Before using the (optional) adapter, remove the rubber eyepiece carefully.

The adapter (Fig. 5) consists of 2 rings:

- a) Camera adapter is 52x0.75mm. It fits the filter lens thread of various cameras, e.g. Nikon.
- b) Video adapter is 37x0.75mm. It fits Sony cameras and some others.



**FIGURE 5**

Camera / Video adapter

If our adapter does not fit your camera from a camera supply store, obtain proper step up / step down rings.

## Using the helmet mount

The Unit can be equipped with an optional NVS H Mount which fits a variety of existing helmet models.

The Unit is fixed to the mount via a locking screw (1, Fig. 6). To adjust the position of the Unit to your eye level, use the mount binding screw (4, Fig. 6). To adjust the eye relief first loosen locking screw and set a comfortable distance between the eyes and the eyepiece; then tighten the locking screw.

The Unit can be fixed in three predetermined positions: vertical, horizontal, and 15-20° above horizontal. Although the relative angles between these positions cannot be changed, the starting point can be adjusted using the flip-up adjustment screws (3, Fig. 6). If you loosen them, you can rotate the flip-up mechanism to

find the suitable starting point. Tighten the screws after completing the adjustment.

You can raise the Unit for unobstructed view without taking the helmet off. To do so press (and hold) the flip-up button (2, Fig. 6) and rotate the Unit until you hear a click.



**FIGURE 6.** Helmet mount

- |                   |                             |
|-------------------|-----------------------------|
| 1. Locking screw  | 3. Flip-up adjusting screws |
| 2. Flip-up button | 4. Mount binding screw      |

All other operations with the Unit mounted on a helmet are identical to those with the headgear.

### **Mounting on a rifle**

The Unit can be mounted on a rifle with one of two Picatinny (MIL-STD-1913) mount adapters—the NVS W Mount or the NVS QR Mount.

The NVS W Mount is affixed to the Unit and the Picatinny rail using oversized, easy to tighten screws. The NVS QR Mount is a ‘quick release’ mount that utilized a lever for affixing to and removing from the Picatinny rail.

### Using with a daytime riflescope



**FIGURE 9.**  
NVS Coupler

Although the Unit does not contain a reticle and thus cannot be used as a standalone riflescope, it can be mounted inline with a magnified daytime or red dot holographic sight enabling night time use.

This can be accomplished either by mounting the Unit in-line of the day sight using the NVS W or QR mount or utilizing the optional NVS Coupler (Fig. 9) to mount the Unit directly onto the eyepiece of the day sight.



**FIGURE 10.**  
NVS Bridge

### Binocular configuration

Two Units can be combined into dual channel night vision goggles/binoculars with the help of an optional bridge. With the use of the afocal 3x add-on lenses, a 3x magnified night binocular can be formed.



**FIGURE 11.** Goggles configuration



**FIGURE 12.** Binoculars configuration

In the dual configuration the interpupillary distance can be adjusted between 58 and 72 mm.



## 6. TROUBLESHOOTING

### **No green (or black and white) image visible**

Check that the batteries are installed properly and are full charged. *Wrongly installed and expended batteries are the most common problems leading users to believe their Unit is defective.*

### **Image is unclear**

Check if the lenses are foggy or dusty. Clean them if necessary. If the image is still unfocused – adjust the diopter correction of the eyepieces. *The image will always be unclear when the objective lens cap is in place. The unit is designed to provide a clear image in dark condition in which the objective lens cap is not required.*

### **Image flashes**

Image may flash during the first two minutes after activation. It may continue flashing if exposed to bright light (even with the lens cap on).

### **Condensation accumulates on Unit**

When the Unit is moved from cold to warm environments internal condensation may appear. If this occurs, the Unit must be warmed up for up to two hours in order to regain full operational capacity.

## **Visibility decreased or disappeared**

Bright light sources (the Moon, projectors or headlights) may cause visibility to degrade or even completely disappear. Move the device away from the light source immediately. The image will be restored within two minutes.

Adverse atmospheric conditions such as fog, haze or extremely dark environments will decrease visibility.

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## 7. WARRANTY

Newcon Optik warrants this product against defects in materials and workmanship for one year from the date of the original purchase. Longer warranty is available, subject to the terms of the specific sales contract. Should your Newcon Optik product prove to be defective during this period, please deliver the product securely packaged in its original container or an equivalent, along with the proof of the original purchase date, to your Newcon Optik dealer.

Newcon Optik will repair (or, at its option, replace with the same or comparable model), the product or part thereof, which, on inspection by Newcon, is found to be defective in materials or workmanship.

### *What This Warranty Does Not Cover:*

Newcon Optik is not responsible for warranty service should the product fail as a result of improper maintenance, misuse, abuse, improper installation, neglect, damage caused by disasters such as fire, flooding, lightning, improper power supply, or service other than by personnel authorized by Newcon Optik.

Postage, insurance and shipping costs incurred while presenting your Newcon Optik product for warranty service are your responsibility.

If shipping from North America please include a cheque or money order payable to Newcon Optik for the amount of USD \$15 to cover handling and return shipping.

## 8. CUSTOMER SUPPORT

Should you experience any difficulties with your Newcon Optik product, consult this manual first.

If the problem remains, contact our customer support department at +1 (416) 663-6963 or toll free at 1-877-368-6666 (North America only). Our operating hours are 0900h to 1700h Eastern Standard Time, Monday through Friday.

**Under no circumstances should equipment be sent to Newcon Optik without authorisation from our technical support department.**

**Newcon Optik accepts no responsibility for unauthorized returns.**

To locate a Newcon Optik Authorized Dealer:

Call: +1(416) 663-6963	Fax: +1(416) 663-9065
Email: <a href="mailto:newconsales@newcon-optik.com">newconsales@newcon-optik.com</a>	Visit: <a href="http://www.newcon-optik.com">www.newcon-optik.com</a>

## 9. ACCEPTANCE CERTIFICATE

Image Intensifier Tube serial number: \_\_\_\_\_

Characteristic	Minimum	Measured
Resolution, lp/mm	64	
Photocathode sensitivity, integral, $\mu\text{A}/\text{lm}$ (@2856°K)	1800	
Light amplification fL/fc (@ $2 \times 10^{-6}$ fc)	40,000	

Date of production: \_\_\_\_\_

Quality Inspector: \_\_\_\_\_

## NIGHT VISION DEVICE

NVS 14-3XT

NVS 14-3AGBW

NVS 14-3AG

Other:

---

Unit serial number: \_\_\_\_\_

This Unit complies with all technical specifications and has passed Newcon Optik's inspection procedures.

Date of production: \_\_\_\_\_

Quality Inspector's signature: \_\_\_\_\_

Quality Assurance Seal

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